The
Electrical Review

VOL. CXI. AUGUST 12, 1932. No. 2855.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

THE ELECTRICAL REVIEW, 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "AGEEKAY, CENT, LONDON." Code, A B C. Telephone No.: Central 5871 (5 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to E.R. (1930) LTD., and crossed "Lloyds Bank."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

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A Popular Fallacy

ENGINEERS unfamiliar with transmission matters who have attended summer conferences on the Continent, and the public, generally, who have noticed on holiday trips abroad the lines transmitting electricity from water-power and other cheap fuel sources (*e.g.*, lignite fields), are inclined to ask why we, in Great Britain, do no follow the same methods. True, we have not the large mountain torrents found in many lands, but why—it is asked—do we not use more of the smaller waterfalls that we have, and why do we not erect our power stations in the coalfields, which are our equivalent of waterfalls?

Often lurking behind these views are the old fallacies that water-power costs nothing, and that the cost of electrical transmission is negligible compared with that of coal transport. A careful study was made of the latter aspect by Professor Marchant in a paper read before the British Association at Johannesburg three years ago, in which the conditions governing the relative economies of the two were worked out in some detail. The president-elect of the Institution of Electrical Engineers also pointed out that the transmission of electricity is primarily an economic problem, as there is no technical difficulty in transmitting energy over many hundreds of miles if we want to. But, the point is that we don't want to; transmission is a necessary evil, justifiable only if greater overall economies result from generating away from the centre of gravity of the load. It is not always realised that the major costs of generating and transmitting electricity are capital and other standing charges; in many cases it could be shown that the cost of electricity produced by a small waterfall quite a short distance from the point of use would be greater than that obtainable from heavy-oil engines installed locally.

When we come to deal with the large blocks of power required for cities we have to take into account the relatively small amount of water with adequate head that is available, most of which can be best used locally for manufacturing processes (*e.g.*, aluminium works) for which large quantities of high load-factor energy are needed at very low rates, which allow little margin for profit even with the cost of transmission eliminated.

In regard to the coalfields, the high calorific value and dryness of our coal reduces the cost of transport per useful ton to a figure very much below that of lignite which has a high moisture and ash content.

But the cardinal point is, in all cases of large-scale steam generation, an adequate supply of water with a low head; every ton of fuel burned requires some 400 tons of water for condensing. Fortunately, industry has tended to follow the river courses, so that in or near large towns good generating sites are usually available—at any rate, with enough water to deal with the peak loads without raising its temperature unduly. The qualification "near" is important, because enough cheap land for plant installation and fuel storage can rarely be obtained at the heart of the industrial area. Clarence Dock (Liverpool) is the only recently constructed capital station which has such a site. We are, in Great Britain, more fortunate than we perhaps realise in the possession of load centres within short distances of each other and of the coalfields; this makes for economical interconnection between these centres and the points of most economical generation without the general necessity of adding the cost of long transmission lines to that of generation.

Ice in August

THE subject of refrigeration, ever an increasingly important one to food suppliers, stores, and private households, is particularly appropriate to the warm days that are with us at the moment. Some measure of progress is being made with this branch of business in this country, and every effort must be made to increase it here from year to year, but our eyes always turn enviously to the greater scope that it has found in the United States. The official E.D.A. view is that a rapid rise of the use of electric refrigeration will follow energetic education. For proof of the accuracy of that view let us note what has happened in America.

In March last year the National Electric Light Association of America organised an Electric Refrigeration Bureau by means of which it brought some thousands of communities into what Mr. J. E. Davidson, the chairman of the Bureau, describes as a business brotherhood.

An Attack on the Public

REFRIGERATION, central station, and dealer interests co-operated, abandoning the view that each of them was a competitor of all the rest, and adopting the idea that the most difficult competitor was any other class of trade that competed for the people's money! In sixteen months as many as 1,230,000 domestic electric refrigerators were sold, representing, as Mr. Davidson states in an American contemporary, a billion dollars in sales to the electric refrigeration industry and nearly thirty million dollars of new annual revenue to electricity works. During the first four months of 1932 the sales were 261,000, and this year's objective is a total of one million. The Bureau movement is being extended amongst other communities and cities for the purpose covered by its title, but it is also regarded as having possibilities for boosting, in turn, other classes of domestic electrical apparatus.

Safety Labels

THE Electrical Apparatus Safety Board which has been established in New South Wales, as announced in the ELECTRICAL REVIEW for July 15th (p. 95), for guarding the public against the sale and use of domestic electrical apparatus and radio appliances judged to be dangerous, is getting ready for an intensive campaign. The work of organising the Board for inspection of all the apparatus to be put on the market is nearing completion. A distinctive seal will be used to certify that apparatus has been found to comply with the imposed safety requirements, and the purpose of the campaign is to urge the public, in their own interests, to purchase and use only apparatus which bears this mark of approval. The authority comprises representatives of the Sydney and Newcastle municipal electricity supply systems, manufacturers of electrical and radio apparatus respectively, wholesale houses, and a nominee to Act on behalf of suburban, country and rural supply systems, whose names are given in our "Personal" page to-day.

An Old Friend

THERE are probably few pieces of electrical apparatus for which the engineer has the same affection as the old "Megger." It always told us the truth, and that was what we wanted, even when a low growl proved the truth unpalatable. But the truth is not acceptable to all men, and the instrument—like any other—is not proof against human dishonesty, as Colonel Vignoles points out in our "Correspondence" columns. This, we understood, was what Mr. Peake Sexton wished to convey in his recent article. Indeed, Colonel Vignoles's recipe of "an honest contractor, a fair price, and a careful inspection and test" appears to us to be the moral implicit in the article in question.

A Reconstruction Scheme

THE scheme for the reconstruction of the British Electric Transformer Company, Limited, of which full particulars were given in our issue of July 22nd (p. 140), received the necessary approval at meetings held in London on Monday The preference and ordinary shares are to be reduced in value and then converted into one class of 5 per cent. cumulative preference shares. A number of new ordinary shares will be issued as fully paid to Crompton Parkinson, Ltd., with whom the scheme has been negotiated. The Crompton Parkinson transformer department will be transferred to the British Electric Transformer Company as from the first of last month. Mr. Frank Parkinson becomes chairman of the B.E.T. Co. and Mr. A. F. Berry deputy chairman. Crompton Parkinson guarantee the fixed interest on the new preference shares, and, as they hold all the issued ordinary shares, will benefit as the changes possible under the reconstruction turn a loss into a profit. It was explained at the meeting that the only alternative to such a scheme would have been liquidation; the new arrangements assure that the business will be continued, its goodwill maintained, and the staff and employés retained.

What the People Need

THE folly of cutting down expenditure upon measures for increasing the sale of electricity for lighting and general domestic use cannot be too often stressed. In their efforts to introduce economies most of our households find electricity an item of expenditure that cannot be cut down. Whatever has been the reason for the troubles of some of the great electrical utility concerns in the States, it is stated that the domestic sales of such undertakings over there have been better than those of other kinds of products used by the public during the extreme and protracted economic depression. By far the worst prostration in American business and the largest unemployment have occurred in industries producing materials and equipment for capital investment in buildings, machinery, and permanent improvement—the production of "capital goods," according to the *Electrical World*, is 75 per cent. less than in 1929; but the production of "consumer goods" is only about 20 per cent. less, notwithstanding the inability of so many millions to purchase them.

Domestic Sales

OUR contemporary makes advantageous use of these figures to stress the urgency for power companies to do their utmost to maintain the demand for electrical consumer goods. "It is a time to be showing every family how to economise by the more intelligent use of electricity for light, for cooking, and for doing the housework. It is a time for developing more efficient sales methods and more proficient staffs." Our electricity consumption in Britain shows an increase, not a falling off, but the arguments apply with force to our own situation. The holiday season will soon be ended. Schemes are already actively preparing for trade campaigns. Let us all approach the domestic electrical sales business with abundant energy and high optimism, for we have a wonderfully promising field in which to work during the autumn.

Electricity and Radiant Heat

THERE is no such thing as 100 per cent. radiant heat in connection with any kind of electrical equipment. To prevent convection entirely the air surrounding the elements would have to be absolutely non-heat conducting. This was brought home forcibly to us recently. In a kiln with quite a small heating chamber the side-wall elements had originally uniform loadings, and it appears to have been claimed that because the heating was wholly radiant it would be uniform. But as the result of increased temperature at the top of the chamber the loadings had to be varied. This important case makes clear the necessity for electrical people quickly to get rid of the false "wholly radiant" obsession; it is bad for prestige.

A Permanent Home

THE regrettable death of Sir Gilbert Garnsey caused a vacancy in the chairmanship of the Committee which has been investigating the important question of providing a permanent home for the British Industries Fair. The Committee was set up at the suggestion of the Chelmsford Committee, which in 1930 examined the whole subject of the Fair and how it could be made to contribute still more successfully to the development of British industry and trade. It is very satisfactory, therefore, that Lord Chelmsford has been induced to assume the vacant chairmanship of the Committee which was set up on his recommendation. We hope that it may not be long before the new proposals take practical form.

Special Squirrel-cage Motors. By D. Dyson Rayner, A.M.I.E.E.

Induction motors for particular uses

THE majority of a.c. motor installations are such that the conditions would be satisfied if the motor could start against 40/50 per cent. torque, taking not more than twice full-load current and being only capable of 125 to 150 per cent. overload. It is possible to meet the first two conditions by using a standard squirrel-cage motor and star-delta or similar method of starting, the motor possessing the usual overload characteristics.

The star-delta arrangement, however, has recognised drawbacks, to overcome which the methods I described recently offer one solution. If, however, the motor is not required to deal with severe overloads, the type described below will be of interest, particularly as it requires the simplest possible form of control gear, *i.e.*, a straight-on starter, thus reducing one item of expense.

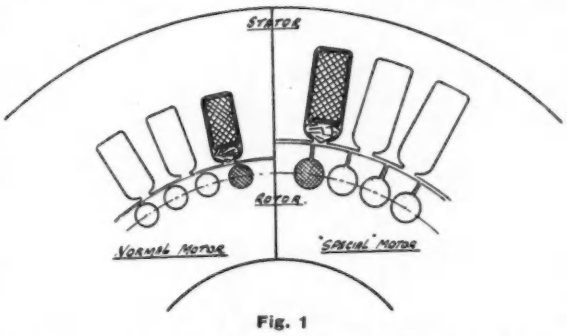


Fig. 1

In general construction, the machine is like the ordinary squirrel-cage motor, with the essential difference that the rotor winding is sunk deeper in the core than is normally the case. This arrangement is similar to the low-resistance winding of a double cage rotor without the latter's outer high-resistance winding.

The rotor core is built up of thick laminations instead of the usual gauge, so that the iron loss (due to eddy currents and hysteresis) generated at line frequency with the rotor at standstill combines to provide sufficient torque with a small starting current when the motor is thrown across the lines.

Some of its Applications

The starting torque is made up of two components: the inherent torque due to design characteristics, which will vary between 20 to 30 per cent., and that due to eddy currents, &c., which will be of the order of 25 to 50 per cent., giving a combined total starting torque of 45 to 80 per cent. with a starting current of from 1.5 to 2.5 times full-load value. The maximum load which such a motor is capable of sustaining is from 1.25 to 1.5 times normal rating, and for applications such as centrifugal pumps, fans, blowers., &c., it is probably the most suitable type of motor, providing, as it does, sufficient starting torque with a small starting current and requiring only a simple straight-on type of starting gear. It would also meet a large number of industrial cases in which overload capacity is of no importance. The essence of the whole scheme is the determination of a suitable working flux and the depth to which the rotor winding should be sunk below the rotor periphery.

Fig. 1 illustrates the magnetic and electrical properties of a 2-h.p., 3-phase, 400-V machine, having the same external core dimensions and for which the following comparable results were obtained:—

	Standard Motor.	Special Motor.
B.h.p. (normal	2	2
Syn. speed r.p.m.	1,000	1,000
Full load r.p.m....	940	920
No-load current, A	2.2	1.0
No-load, watts	150	80
Full-load current, A	3.5	3.5
Full-load stator copper loss, watts ...	220	220
Weight of stator copper (lb.)	8	15
Full-load rotor copper loss	100	130
Weight of rotor copper (lb.)	5	6½
Max. h.p.	4½	3
Max. temp. rise (6 hrs.)	63° F.	58° F.
Straight-on starting current, A ...	16 = 4.5 F.L.	8.1 = 2.25 F.L.
Straight-on starting torque	125% F.L.T.	50% F.L.T.

The special motor was made to replace a standard machine for driving a hydro-extractor, to which exception was taken by the supply authorities on account of the heavy starting current for a prolonged period; the star-delta starter was objectionable owing to the "snatch" at change-over, and other types of starter were too expensive.

These results serve to illustrate the possibilities of designing motors to comply with supply authorities' requirements as regards starting current, providing overload capacity is of no consequence.

Fig. 2 shows the relative circle diagrams from which the general technical characteristics of the standard (left) and special motors can be readily compared. It will be noted that the normal load power factors agree closely and, although the rotor reactance in the special motor is higher than in the standard machine, the working flux is deliberately kept low to maintain as near as possible a similar power factor.

The torque/speed and current/speed curves are reproduced in fig. 3. The torque curve for the special motor is shown made up of its two components as previously described. Values were obtained from tests on a rotor built with normal laminations of 26 S.W.G. and a rotor built with thick laminations of 16 S.W.G.

Efficiency and Power Factor

The efficiency and power factor curves show a considerable advantage in favour of the special motor over the standard motor, the maximum values being obtained between quarter and full load, which is the average working load of the majority of industrial motors. Comparatively few are required to take advantage of the inherent overload capacity; in fact, they are the exceptions rather than the rule, and the type of motor described as special would be better for the user if applied as normal, in which case an advantage would be secured in improved efficiency and power factor, thereby lowering operating costs.

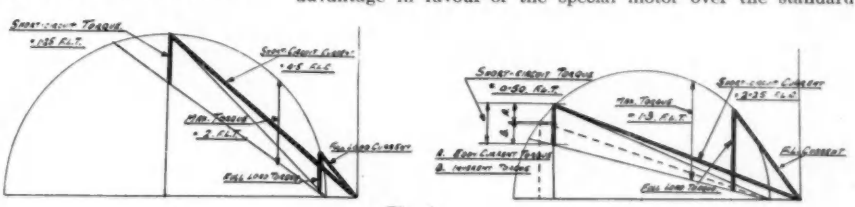


Fig. 2

The iron loss in the rotor during acceleration is due partly to eddy currents, which vary as the square of the frequency, and partly to hysteresis, which varies as the first power of the frequency, so that the torque due to iron loss does not fall away as the square of the reduced frequency in the rotor with increasing speed of rotation, but at some intermediate value that has a tendency to give smoother acceleration than would be the case if the iron loss were reduced as the square of the frequency.

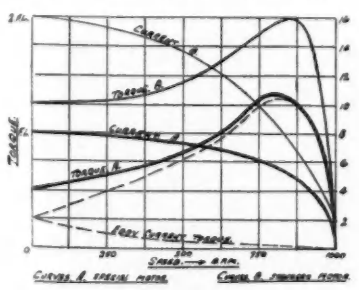


Fig. 3

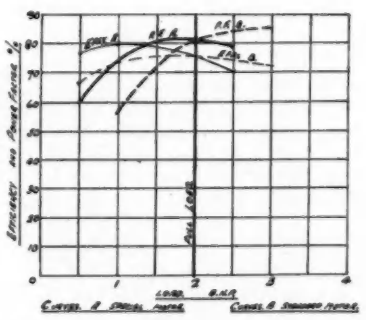


Fig. 4

Similar results to the foregoing were obtained in the case of an electrically driven centrifugal pump; in this instance a 30-h.p., 1,500-r.p.m. squirrel-cage motor, as described, was installed. The short-circuit current of a standard motor of this size is 8/10 times the normal value and in this particular case the starting current, which is also the short-circuit current, was brought down to 2.3 times normal. This is an improvement on the star-delta starting of a standard motor, which would require approximately three times normal current. Here, again, the overload capacity is reduced from 2½ times normal to 1½ times, the power factor is 0.88 instead of 0.92, whilst the efficiency remains the same and the application is ideal from all points of view.

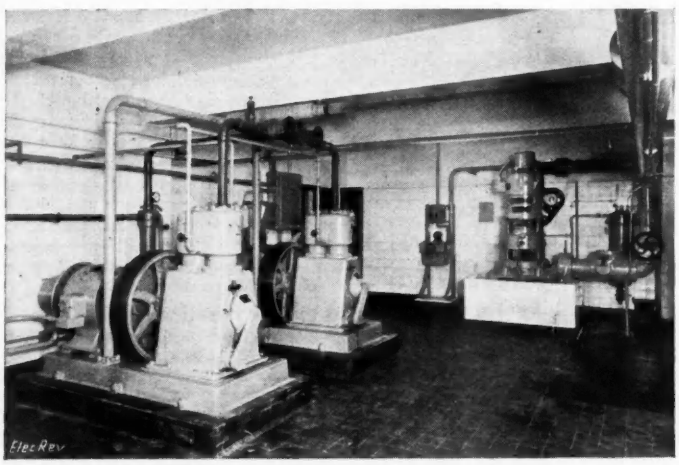
It is, of course, recognised that such machines represent a departure from the B.S.S., which stipulates sustained and momentary overloads, but conditions have changed considerably since that specification was framed and the present would appear to be an opportune time for its revision.

The Unilever House Installation

ELECTRICITY plays an important part in every service in Unilever House, the new London headquarters of Lever Bros., Ltd., Unilever, Ltd., Jurgens, Ltd., Van den Bergh, Ltd., and the United Africa Co., Ltd. The building was designed by Mr. J. Lomax Simpson, architect, and a managing director of Unilever, Ltd., in collaboration with Sir John Burnet, Tait and Lorne, architects. Mr. R. G. Devey, M.I.E.E., electrical engineer to the company, co-operated with the architects in designing and carrying out the extensive electrical installation.

The whole of the water supply for the building is obtained from two wells on site. One of these, 4,000 gal. per hour, is served by a centrifugal pump at the water level (500 ft. deep), carried from a thrust bearing beneath a 23-h.p. vertical motor above ground.

Water is pumped from the other well (600 ft. deep, 2,900 gal. per hour) by compressed air from one of two air compressors, 120 lb. per sq. in., each driven by a 40-h.p. motor. From the wells water is pumped to a storage tank at floor level, from which it is conveyed to storage tanks on the roof by 15-h.p. motor-driven pumps automatically controlled by float switches. The pumping plant was supplied by Isler, Ltd., and English electric motors and switchgear are employed.



Air compressors and vertical pump drive in well room

A Mather & Platt 57-h.p. motor-driven boosting pump serves the fire-fighting system. When the line pressure falls to 120 lb. per sq. in. a spring valve is released and operates a weight-controlled switch governing the solenoid control for the liquid motor starter.

Boiler Plant

Four 6¼-million B.th.u. per hour Hartley & Sugden boilers serve the 730 radiators of the hot-water central heating system, and the ventilating plant. Two 2½-million B.th.u. per hour Davey Paxman steam boilers serve for cooking and domestic hot-water supplies, in conjunction with calorifiers.

Eleven " Bull " motors, with Brookhirst starters all at one point, drive all the auxiliaries, including the three 3½-h.p. combined fan and pump drives for the oil burners for the large boilers. Oil to the boilers passes through containers equipped with immersion heaters for thinning the oil when starting cold. The oil feeds are thermostatically controlled by Hotpoint equipment. Four 5-h.p. motor pumps circulate hot water round the radiators, and two 1-h.p. units serve for the hot-water basins.

On the heating control panel temperatures at various parts of the building are indicated by electrical distance thermometers on a multi-switch instrument (Negretti & Zambra). There are three " Plenum " ventilation systems with 30-h.p., 8.5-h.p., and 7-h.p. " Bull " motor fan drives, and 12-h.p., 8.5-h.p., and 4.5-h.p. similar spray drives respectively. Extracting fans on the roof are push-button remote controlled from the other end of the system in the sub-basement. All these motors have Brookhirst contactor starters.

Ten Waygood-Otis 400 ft. per minute passenger lifts are of the unit-multi-voltage gearless type with the car and landing gates air controlled through electrical solenoids. These lifts are equipped with inter-communication indicator lights and car switch control. Cornice lighting in the cars is an unusual feature. For the air supply two compressors are driven by 8-h.p. Lancashire motors with automatic control. When a spring overcomes the line air pressure an electrical contact is made which operates the starting contactors through solenoids. There is also a 2-ton Waygood-Otis goods lift, 275 ft. per minute. All the lifts are fitted with micro-levelling gear.

Two 35-h.p. motors drive Sturtevant vacuum cleaning plant, with 170 outlets. Special consideration has been given to the lay-out of the wiring installation which is in ducts and conduits, including the telephone services, to avoid surface wiring on walls. Specially designed outlets with covers were built into the main structure.

Lighting

The lighting may broadly be divided into two schemes—general and special. The general lighting employs mostly 14-in. (200-W) and 12-in. (150-W) spheres suspended by small chromium-plated tubes or chains from c.p. ceiling roses. In low-ceiling rooms there are hemispherical deck lights.

All the general fittings were supplied by Messrs. Osler & Faraday. We prefer to let the illustrations tell the story concerning the special lighting, which is indeed a credit to the designers and manufacturers, Messrs. Troughton & Young, Ltd., electrical contractors for the whole installation. All the special fittings were made to drawings submitted to the architect, and they are all " anodised " finished. Except for the board room, where there is cornice lighting, all the special equipment is of the panel, lay light, and " window " types.

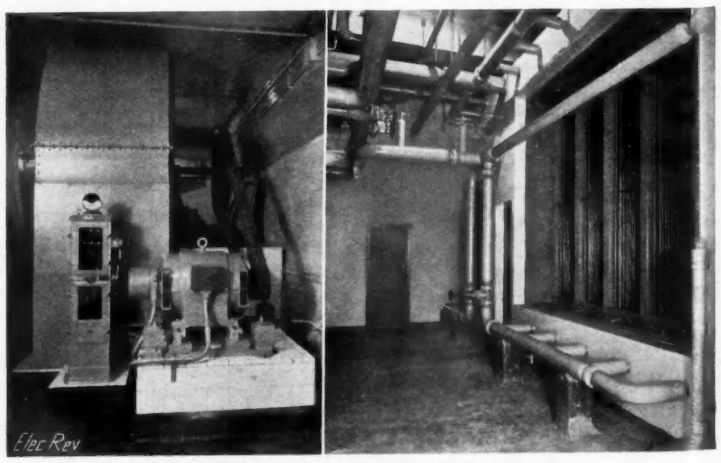
The front of the building is floodlighted by 110 G.E.C. 500-W projectors, all Venner time-switch controlled. A Post Office 14-operator manual switchboard, with provision for 1,000 internal extensions, is served by a 200-line incoming cable. There is also an internal automatic Standard telephone system with an 800-line board, with provision for another 400 lines.

A complete inter-communicating telephone system specially designed by Standard Telephones and Cables, Ltd., offers the directors facilities for calling their own staffs and special individuals, apart from the automatic system, and for " holding " incoming calls on the automatic system while information is obtained over the special system. There are installed two teleprinters and one telewriter machine. About 170 " Synchronome " clocks in several circuits are controlled from one master. There is a 100-line G.E.C. watchman's electrical recorder.

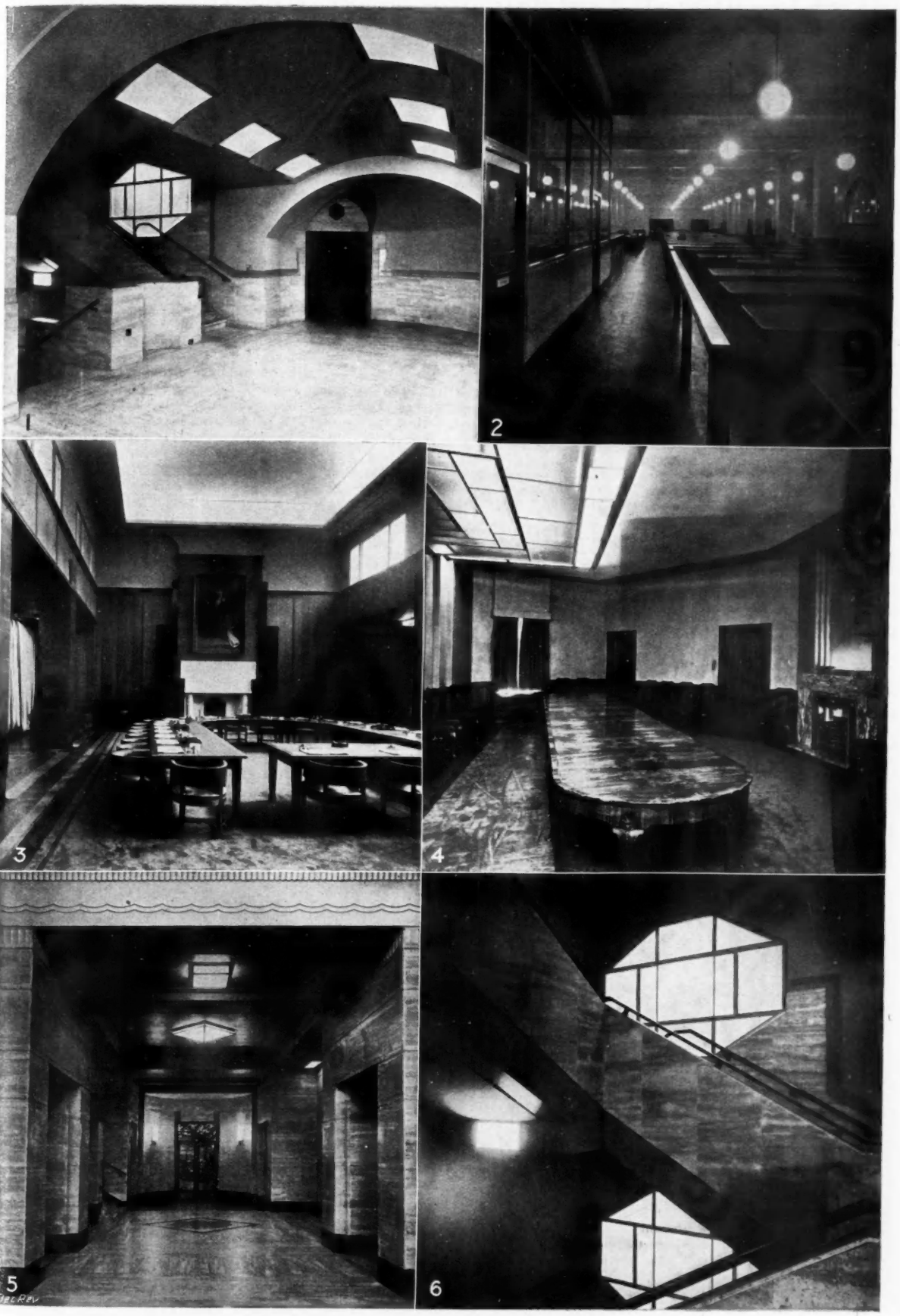
Supply is received from the City of London Electric Lighting Co. at 11,000 V, 3 phase, 50 cycles, by duplicate feeders which may be switched separately at will by the consumer.

The main switchgear is of the English Electric horizontal isolation type (400 A) with two incoming and two transformer units and a bus-bar coupler. Two English Electric 1,000-kVA transformers are oil cooled and supply to 400/230-V G.E.C. metal-clad distribution switchgear *via* English Electric l.p. cubicles. All the main distribution cables (Callender's) are fibre insulated, l.c. and s.w.a., to prevent bleeding difficulties on vertical runs.

The whole of the wiring was supplied by the Edison Swan Electric Co., Ltd., and the conduits by the Walsall Conduits Co., Ltd.; many supplementary heating and lighting plugs were supplied by M. K. Electric, Ltd.



Ventilating-fan drive and main air inlets



Features of the Lighting at Unilever House (*See opposite page*)

1. Window and lay lighting on landing; 2. General office illumination; 3. Cornice lighting in board room; 4. Directors' dining room; 5. Main entrance hall; 6. Window lighting on staircase

The Loading of Boilers.

By R. Livingstone, A.M.I.E.E., A.M.I.Mech.E.

Methods of ascertaining the increment rates

THE allocation of load to power plant units, running in parallel, in accordance with the increment rate of each unit is the easiest method of obtaining the minimum possible heat consumption for the total load. Where heat consumption follows a straight line from no load to the maximum economical load the total heat consumption $= a + b$ kW, a being no-load heat consumption, and b the increment rate.

The allocation of load should be such that the machine with the lowest increment rate always carries its maximum economical load, and the machine with the highest increment rate the minimum possible load. This arrangement gives the minimum total heat consumption.

There is no direct connection between the overall efficiency of a machine and its increment rate, so that the increment rate is not the factor considered when deciding which units should be brought into service to meet a given demand. The average efficiency for the range of load required is the factor which should determine the best order to bring the various units into service, but when several units are operating in parallel the allocation of load should be in accordance with their increment rates and not their overall efficiencies.

In all cases due regard must be paid to the operating limitations of each unit as heat economy is only one of many factors. This applies more particularly in the boiler house where individual boilers may require very careful handling to keep them in service, and no attention can be given to economic allocation of load.

In general, however, it is possible to allocate load in the boiler house in accordance with the increment rates of each boiler, when the increment rates are known.

Minimum Heat Consumption

The increment rate of a boiler varies throughout its range of evaporation, and it may be accepted that the minimum overall heat consumption of boilers in parallel, drawing feed water from a common source and delivering to a common steam main, is obtained when the evaporation of each boiler is adjusted to give a uniform increment rate for each. As the increment rate (above a very small minimum rate) increases with the rate of evaporation it is economical to keep boilers required for the peak load in service down to very light loads (*i.e.*, to run with the minimum possible number of banked boilers).

The predetermination of the most economical number of boilers which should be brought into service requires an accurate knowledge of the general efficiency curve of each boiler under the actual working conditions of the heating surfaces; the same data are also required to obtain the increment rate necessary for economic load allocation. It is not correct to assume that an efficiency curve obtained from test data is correct under all conditions.

Fig. 1 shows the flue gas outlet temperature—T_e—of a modern boiler and the normal values of CO_2 for different values of heat consumption. The lower values of T_e were taken when the boiler was new, and the upper values twelve months later, at the end of a steaming period when the heating surfaces were dirty. There was no appreciable change in the values of CO_2 during this period. The variation in the dry flue gas loss corresponding to this increase in temperature is appreciable. For the lower values of T_e the loss ranges from 10 per cent. for $H = 30 \times 10^6$ to 6.6 per cent. for $H = 130$, and for the higher values from 11.6 per cent. for $H = 30$, to 10.3 per cent. for $H = 130$.

The effect on the increment values is greater still, and it would not be economical to load up the boiler when dirty to the rate of evaporation corresponding to increment test figures when the boiler is new.

In preparing increment rate curves from test data it is necessary to identify the test curve with a particular condition of the boiler, to estimate the change in the increment rate, and plot similar curves for other conditions.

Some losses are practically independent of the condition of the heating surfaces, *viz.*, (1) radiation, leakage, &c.; (2) unconsumed carbon and sensible heat in ash; (3) power for auxiliaries; and (4) evaporation of moisture in fuel and formed by hydrogen.

Effect of Free Moisture

The loss which varies with the condition of the boiler is the loss in the flue gases. The unaccounted losses in an actual test can be assumed as independent of the condition of the surfaces without introducing a possible error of great importance. The flue gas loss (for temperatures over 212 deg. F.) comprises the dry gas loss and also the loss due to superheating the moisture in the fuel and formed by hydrogen. The latter loss is proportional to $(T_e - 212)$ and the former to $(T_e - \text{air temp.})$. As the heat required to superheat the moisture is a very small proportion of the dry gass loss, it can be taken at an average value of T_e and included in the loss due to evaporation.

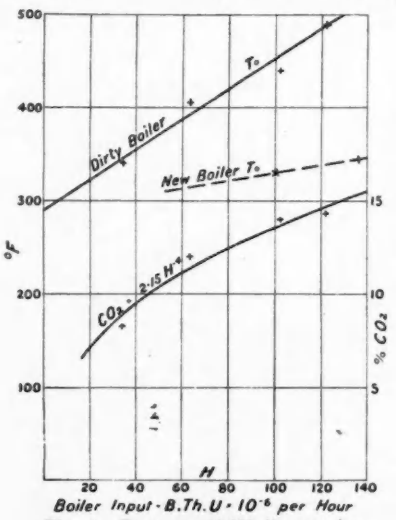


Fig. 1.—Tests on 80,000 lb. per hr. boiler

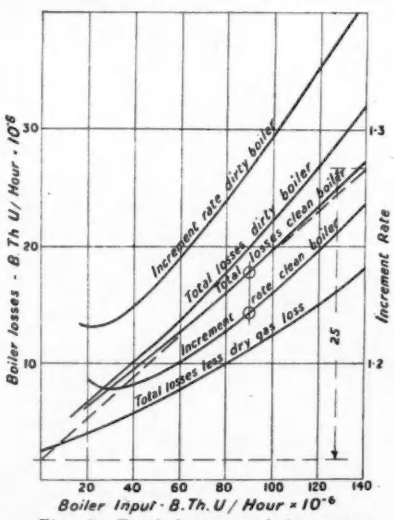

Increment rate dirty boiler
Total losses dirty boiler
Total losses clean boiler
Increment rate clean boiler
Total losses less dry gas loss
Boiler losses - B.Th.U. / Hour - 10^6
Increment Rate
Boiler Input - B.Th.U / Hour × 10^{-6}

Fig. 2.—Total losses and increment rate for clean and dirty boiler

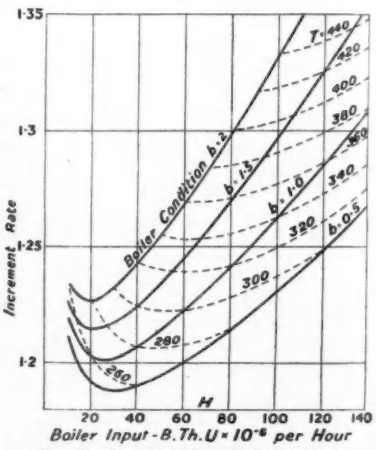


Fig. 3.—Increment rate for any condition of boiler

As the total heat required for evaporating and superheating the free moisture from 60 deg. F. to, say, 350 deg. F. is 1,181 B.th.u. per lb., a variation of one in the percentage of free moisture varies the increment rate on this account by $\frac{1}{10}$th of one per cent. when the calorific value of the fuel is 11,810 B.th.u. per lb. The heating value of the fuel as fired varies with the free moisture, and this gives an error of greater magnitude in the moisture losses.

Variation in Dry Gas Loss

The principal variation in efficiency and increment rate for a given fuel can therefore be taken for practical purposes as due to the variation in the dry gas loss, and increment rate curves prepared from test data with an allowance for this loss need only be revised for a change in the quality of the fuel or for extreme variations in the amount of free moisture.

When C is the carbon content per lb. fuel as fired by ultimate analysis, T the outlet gases temperature less air temperature deg. F., CO_2 the volume per cent. in dry gases, B.th.u. the calorific value of fuel as fired (gross value) and g the per cent. loss in dry flue gases, the total volume (V) of the dry flue gases at 62 deg. F. is $147\ (21\ C/CO_2)$.....(1)

The specific weight of the gases varies slightly with the composition, but can be taken at an average value of 0.08 lb. per cub. ft. The specific heat with constant pressure varies slightly with both the composition and the temperature, but can be taken as 0.242 B.th.u. per lb. per deg. F. over the ordinary working range for practical purposes.

The loss of heat in the dry flue gases in B.th.u. per lb. of fuel is therefore 59.8 CT/CO_2 and the percentage loss (g) (when K=5,980 C/B.th.u. per lb.) is KT/CO_2 .....(2)

Carbon Content of Fuel

The heating value of the fuel and the carbon content are closely related and the average value of C/B.th.u. per lb. for the bituminous coals in Great Britain is 0.59 to 0.60×10^{-4} and K becomes 0.35 to 0.36.

The heat output for a boiler (E) in B.th.u. per hour being the heat input (H) less losses (L), the increment rate for the boiler is $dH/dE=1/1-dL/dH$.....(3) The value dL/dH is the tangent to any point on the curve giving the value of L for various values of H.

For example, the total losses on test, less the dry gas loss, for the boiler referred to in fig. 1 are shown graphically in fig. 2. The dry gas loss was calculated from equation (2) with a value of K of 0.35 deducted from the total losses, and a mean curve drawn through the points so obtained. Taking the two different conditions of the boiler, when clean and when dirty, the variation in total temperature is as shown in fig. 1; the dry gas loss can be calculated from equation (2) for each condition for various values of H. The total losses for each condition are shown in fig. 2. The increment rate at any point is obtained as shown by the dotted construction line passing through the point marked O on the total loss curve for the clean boiler. From this dotted line the value of $dL/dH=25/140$ and from equation (3) the increment rate at the point O is 1.22.

Curves giving the variation of T/CO_2 at the increment rate can be plotted as shown in fig. 3. In this case the values of CO_2 do not change with the condition of the boiler, and the flue gas temperatures follow a straight line of the form $T=a+bH$.

Condition of Heating Surfaces

The value of b has in this case been utilised to identify the condition of the boiler. When the temperature of the gases does not follow a straight line the family of T/CO_2 curves can be identified by arbitrary numbers or letters, and the same numbers or letters used on the increment rate chart. If the value of T (or T_a) is added to the increment rate chart as shown dotted in fig. 3, the increment rate can then be obtained for any condition of the boiler from the rate of heat consumption and flue gas temperature alone. For example, in fig. 3, with $H=120\times10^{-6}$ and T=360 deg. F., the increment rate is 1.285 and will follow the line marked $b=1.0$ with variation in load.

Fig. 3 shows that in many cases the change of increment with the change in condition of the heating surfaces is as important as the change with the rate of heat consumption. To show the possible loss due to incorrect loading, assume there are three boilers in parallel with increment rates in accordance with fig. 3, a total heat consumption of 180×10^6 B.th.u./hr., and conditions of surfaces as given by $b=0.5$, 1.0, and 1.5 respectively. The mean increment rate for equal loading is 1.223. If the allocation of load is altered to give equal increment rates, the rate will be found to be ½ per cent. less. The use of charts as shown in fig. 3 is only correct when the boilers are drawing feed water from a common hot well and delivering steam to a common receiver at the same pressure and temperature.

Where the heat output from a group of boilers is utilised with varying efficiency the curve of losses should include all the losses which vary with H. In many cases the final steam temperature from each boiler is not the same, and the gain or loss as compared to standard conditions due to this variation should be included in the boiler losses.

Some Driving Forces in the Industry: Best and Lloyd, Ltd.

Top Left: Mr. B. H. W. Spittle, director; top right: Mr. B. B. Blackburn, London resident director; centre: Mr. R. D. Best, chairman (*H. J. Whitlock & Sons*).

Single-phase Meters. By W. P. Trenhail, Grad. I.E.E.

Ordinary and prepayment instruments of the induction type

THE present tendency in meter design seems to be to reduce the overall size and weight, but my experience is that light meters are easily damaged, especially when glass windows are fitted in covers not made of cast iron or pressed steel. Many gas meters are fitted with metal window covers; these could be used with advantage on electricity meters, especially prepayment meters, which are often severely handled by the consumer.

A common cause of trouble with prepayment meters is that two coins may have to be inserted before the meter circuit is closed. Should the first coin fail to work, the consumer is usually unwilling to try a second and calls in the supply authority's man. Some makes of meters are particularly liable to this disability, and no amount of care taken in the test room before installation can prevent it. The consumer can be notified of the likelihood of this trouble occurring and advised to keep a certain amount prepaid, but, in the case of shilling slot meters fixed in small working-class consumers' installations, it is unlikely the advice will be carried out. It is an advantage to fit penny slot meters in such installations. Then if the meter circuit fails to close on inserting one penny, the consumer will try a second. Again, the consumption of electricity is increased, because consumers find it much easier to pay in pennies than in shillings.

Elec Rev

Mr. W. P. Trenhail is a member of the Test Department staff of the Southampton Corporation Electricity Department

The Shilling or Penny Type?

One objection often raised against penny slot meters, is that there will be twelve operations of the meter switch as against one of the shilling slot meter, resulting in greater wear of the switch mechanism. This is rarely the case in practice, as the consumer generally makes use of the prepayment mechanism of the meter to the extent of several coins, whereas with the shilling slot consumer, the prepayment mechanism is used only to the extent of one coin.

Several years ago, one undertaking changed several hundred consumers' meters from the penny to the shilling pattern as the former were of an old type giving much trouble. There was afterwards a noticeable decrease in consumption, many consumers limiting themselves to one shilling, which was put in the meter at the end of the week. If the prepaid supply was exhausted in the middle of the week, the consumer remained without light. It is often difficult to insert a coin in some makes of slot meters which have been in use for some time, due to the clogging of the coin drum with foreign matter. This usually occurs with meters having no cover for the coin inlet, and it is surprising to find meters in use without this simple and necessary attachment which guards against a good deal of trouble.

Testing New Meters

Some supply engineers hold that it is unnecessary to test new meters before installing them on consumers' premises, but no matter how carefully the manufacturer tests his products, he cannot guarantee that the results will be the same after delivery. Tests taken on several 600-W a.c. induction meters of two well-known makes have shown marked departures from accuracy between full load and one-twentieth of load. Two meters from one works gave 0 and −3.2, and +0.8 and −2.9; from the other the corresponding figures were −1.6 and −3.2, and −4.8 and +0.7.

A modern induction-type a.c. meter can be accurately adjusted within the limits of plus or minus one per cent. between full and one-twentieth load, and the meters tested were adjusted within these limits. In the case of one make six meters were in order, but various troubles were found with the rest. The driving worm on the rotor of one showed signs of wear; the dial train of another was too deep in mesh with the driving worm; and the accuracy of the remainder was affected by filings and other foreign matter, which prevented free rotation of the rotor between the poles of the Foucault brake. All except two meters supplied by the second maker appear to have been incorrectly adjusted at the works. One stopped on one-hundredth load, due to friction in the rotor top bearing. In nearly all these meters foreign matter was found adhering to the brake; this is undoubtedly the commonest cause of trouble.

When this foreign matter is sufficient to stop rotation of the disc it is easily detected, but where the obstruction acts intermittently, or results in only a small reduction of the disc speed, it is difficult to detect, and faulty meters may remain on consumers' premises for many years, resulting in a loss of revenue. A consumer who has had such a meter on his premises, will usually dispute the accuracy of his account after a new meter has been installed.

A wide air gap in the Foucault brake reduces the filing trouble. Care should be taken when tightening steel adjustment screws to avoid burring the screw heads, as filings from this source have a way of attaching themselves to the brake. In many meters, sufficient care has not been shown in the design of the counter train; pinions are easily bent with slight pressure; gear wheels and bearings become corroded, and too finely cut gear teeth soon show signs of wear. The figuring of a meter train should be easy to read, but some makes of meters are sadly deficient in this respect.

Effects of External Influences

A point overlooked by some manufacturers is the effect of external magnetic influences on the performance of their meters. The following figures were obtained as the result of a test on one class of a.c. induction meter of a well-known meter manufacturer.

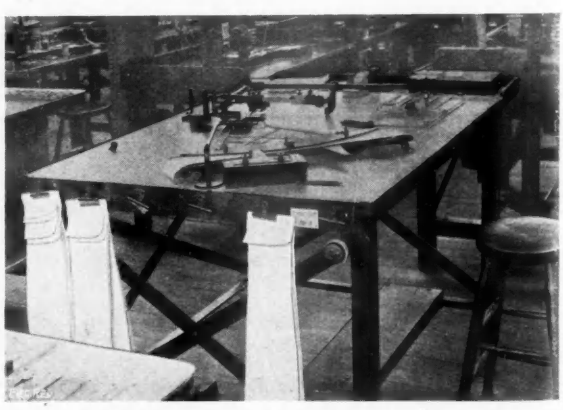
	Full load.	Half load.	Tenth load.	Twentieth load.
No. 1 ...	0.2+	0.3+	—	0.1+
No. 2 ...	12.4+	12.2+	12.0+	12.2+
No. 3 ...	9.2−	9.0−	9.4−	9.0−
No. 4 ...	4.7+	4.5+	4.2+	4.3+

No. 1, normal load test; No. 2, a small permanent magnet applied to the meter case in close proximity to the Foucault brake with the magnetic poles arranged N-S, S-N; No. 3, the same magnet used, with poles arranged N-N, S-S; No. 4, a piece of sheet iron $\frac{1}{16}$ in. thickness placed in the same position as the previously used external magnet poles.

It may be said that consumers would be unlikely to interfere with the meter by the use of magnetic fields, but a meter should be designed to avoid even this possibility, as there is a small proportion of dishonest consumers on most undertakings.

Changes in Meter Design

Laboratory tests of a meter can be misleading, otherwise there would not be so much trouble experienced with manufacturers' new products when installed. It is my experience that many meters have been marketed too hastily, causing unnecessary expense to supply authorities with troubles on circuit. It is refreshing to find some manufacturers who, years ago, produced such a good product that even to-day it has only been modified in a few details. To cope with the diversity of types of meters on their undertakings, supply authorities have to keep a great number of spares which year after year continue to increase in variety. Here standardisation is necessary, and supply authorities cannot be blamed if, finding one type of meter satisfactory, they use it and exclude all others.



Dial-writing table with special pantograph arrangement (see "Manufacturing the Meg," page 217)

Manufacturing the "Meg"

How a familiar form of testing apparatus is produced

THAT the least is known about those things which are most familiar is certainly true of many electrical productions, so far as the manufacturing processes are concerned. A case in point is the "Meg" insulation testing set made by Messrs. Evershed & Vignoles, Ltd.

There is no need for us to refer to the principle of operation of this instrument, nor to its uses and methods of use. Further, while some of the most fascinating processes that we saw in the Evershed & Vignoles shops included gear cutting on precision machines, grinding in place of the machining of castings direct from the foundry, and the turning of delicate spindles, &c., on "miniature" lathes, all involved in making the "Meg," it will be necessary for us to confine our attention to the principal features of the master parts of the instrument — the generator, ohmmeter and the scale.

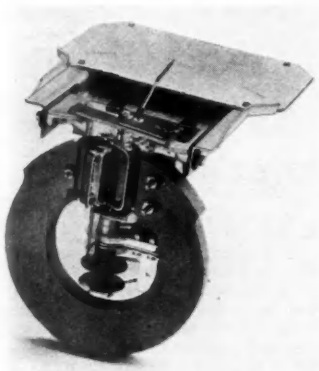
A line of armature-winding machines

Constructing the Generator

The circular eight-slot armature laminations from the press shop and the spindle from the machine shop are received assembled as a unit in the winding room. At each end is an ebonite disc, belled at the centre to accommodate a washer to which the laminations are riveted. An ebonite sleeve is inserted in each slot, and the ends of this are turned back on to the stampings in a specially designed press with an electrically heated and water-cooled tool. The heating is time controlled, the time indications being given by a small lamp.

Components of the "Meg" dis-assembled; generator unit with section out of case, ohmmeter end bracket, driving-gear wheels, armature, friction clutch, driving handle and generator stator

In the winding machine four actual coils are wound separately in opposite pairs of slots, but each pair is connected as a single winding, so that there are two windings normal to each other. The armature is clamped in the arm of the winder while enamel-covered wire is fed through half-egg-shaped metal guide pieces. The coils are insulated in three sections by specially shaped and stamped pieces of insulating fabric, with fingers for under- and over-lapping. An ebonite protecting piece is slipped over the coil in each slot, and the outer coils are tape bound to prevent their movement under centrifugal action at the working speed of 4,000 r.p.m.



Ohmmeter and instrument scale assembled as one unit

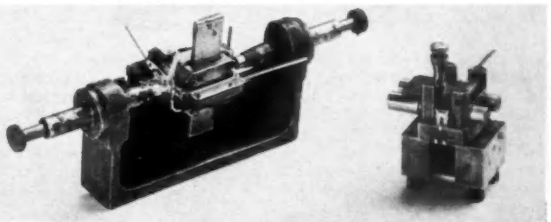
The two end laminations have projecting lips, between the slots, parallel with the spindle, and under these are pressed "Bakelite" end caps, the lips being closed down and pressure held. The four ends of the two windings are brought out through holes in the appropriate cap and taken to the commutator segments. The commutator is assembled as a complete unit and is held to the spindle by a set screw. Copper segments and ebonite washers are interlaced over an ebonite bush, the insertion of the rims of the washers into the grooves of the channel-shape semi-circular segments making a very secure job.

The four segments are arranged in two pairs at right angles with respect to the armature windings, and each pair forms a ring with two breaks. Each segment is stamped out complete with its lead-in wire in one piece, thus eliminating a little trouble that had previously been experienced with joints. Before assembly the armatures are tested at 3,000 V d.c. on one of the company's commercial-pattern h.p. testing sets, and the end caps are marked to convey such information as insulation and resistance values, the operative's number, &c.

Resistances and Ohmmeter

Winding the resistance bobbins for the pressure and current circuits calls for deftness and skill. On the porcelain bobbin, mounted in the winder, a copper strip is first placed longitudinally along the surface, and one end of the coil is then soldered to one end of the strip. Specially light soldering irons designed and made by the company are used for this purpose. Ten or twelve layers of silk-covered wire is then wound on to the bobbin, with paper insulation under the bottom layer and between the others. Four bobbins for each instrument are mounted end-on on a metal plate and connected up as two units.

For delicate construction work making the ohmmeter movement is probably the best thing to be seen in the works. The necessarily very small formers render the use of ebonite impracticable, and aluminium stampings are employed. They are treated on the winding surfaces with several coats of special varnish before being wound on hand or bench winding machines. Assembling the current, pressure and compensating coils in their correct relationship into one unit is an intricate task. These parts, with the end-plate for carrying the pointer and balance weight, are mounted in a special jig, a tiny affair which could easily be a miniature model of some of the large jigs one sees in heavy-engineering shops. In position on the jig the coils are secured to one another by cement and clamped by lugs on the formers.



Ohmmeter coils mounted in small jigs for assembly

The calibrating of the scales is extremely interesting. A separate calibration is made for every instrument; making the instrument to the scale does not afford the extreme accuracy necessary. In the first place readings of the "Meg" under actual working conditions, with standard resistances, are recorded on a strip of paper, magnifying the actual scale about five times. The scheme may best be described as an optical method of lengthening the instrument pointer.

Carrying the special marking mechanism (to avoid pencil errors) for the paper strip is a long radial arm under which the instrument is correctly placed. This arm is accurately arranged in line with the pointer for the readings required by microscopes carried on it. The enlarged paper scale is then reproduced on to the scale plate proper by an ingenious pantograph arrangement by which the figuring and wording are also reproduced from enlarged inset patterns.

Space permitting, much could be written about the skilled operations involved in the general assembly work, apart from fitting the ohmmeter in its magnet frame, joining and fitting the connecting ligaments, and assembling the generator stator, &c., but it will probably suffice to depict a few of those operations which attracted our attention most. It should be said that all the production equipment referred to has been specially designed and built by the company.

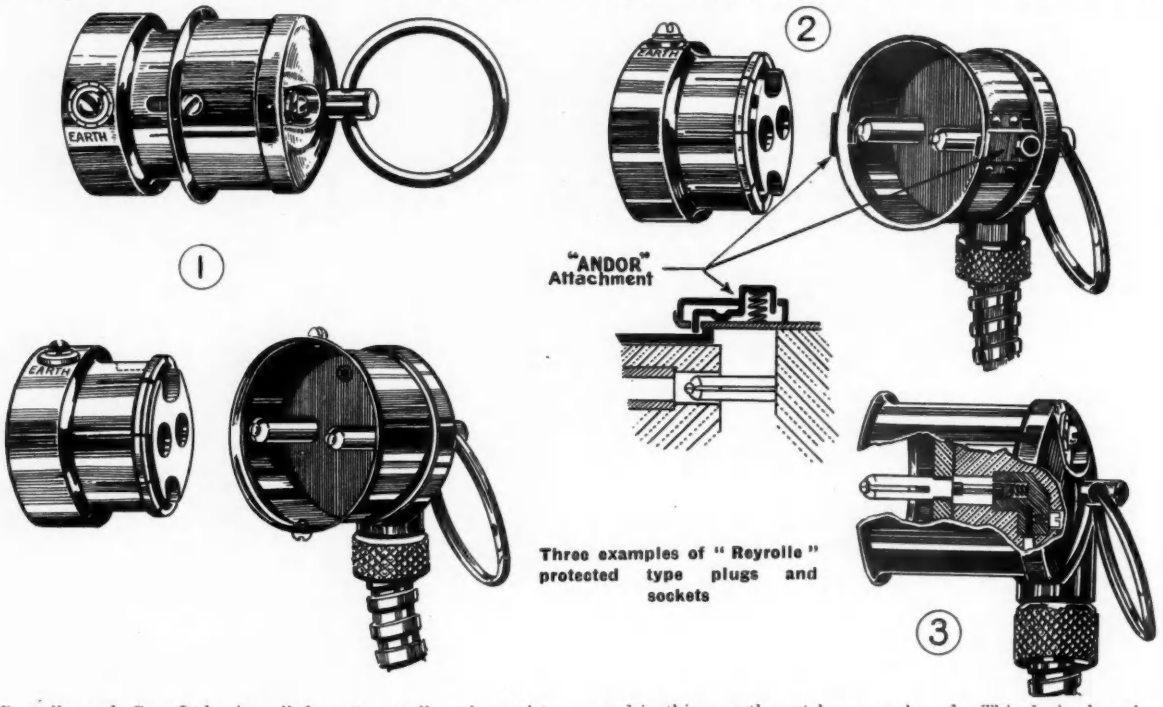
New Protected Type Plugs and Sockets

BRITISH Standard Specification No. 196-1930 covers 5-A, 15-A, and 30-A two-pin protected type plugs and sockets with scraping earth connections, and numerous tests have proved these to be capable of carrying substantial overloads. It has also been shown that, for a.c. of the values used for domestic appliances, it is possible to break circuit without injurious arcing on these plugs, using only very small, slow breaks. Since quick-break switching devices are redundant under these conditions, and since considerable economy can be affected by combining the switching and plugging functions, it has been possible to develop a single article for use as a switch-plug, conforming to the B.S. Specification.

The particular form of this manufactured by Messrs. A. Reyrolle and Co., Ltd., is called a "swug" and consists of a socket and a plug without external connections, but with its two pins connected to each other inside the casing. A limited-travel arrangement prevents the plug from being entirely withdrawn from the socket, and allows only enough motion for the pins to break contact with the contact-tubes. This forms an effective s.p. double-break all-enclosed metal-clad switch-unit.

Just as with a "swug" it is not necessary to withdraw the plug completely from the socket for isolation, so an ordinary plug when used as a d.p. connector to an appliance need only be partially withdrawn to break the circuit, and may remain on the socket in such a position that the live contact-tubes are totally enclosed. Probably the simplest method of preventing the complete withdrawal of the plug is to have one or two set-screws or stop-pins fixed in the plug-casing and arranged to engage with a slot or slots in the socket-casing (see 1 in the accompanying group of illustrations). In this way a convenient switch-and-plug combination is provided for use in conjunction with non-portable apparatus.

For portable apparatus, however, the combination must be provided with suitable means for releasing the plug entirely. This may be obtained by using stop-screws with milled heads, or by using a bayonet or half-turn slot in the socket-casing. An arrangement of the type shown in 2 is very convenient from the user's point of view. It consists of two small trigger releases, fixed one on each side of the plug-casing, with small catches projecting through slots in the casing. These catches are directly operated by the triggers, which are provided with light springs to keep the catches normally engaged, *i.e.*, projecting through the casing. When the plug is withdrawn, the catches come up against the scraping-earth lip on the socket-casing and so prevent complete withdrawal. If the plug has to be removed altogether, the two buttons attached to the triggers are lightly gripped between the thumb and fore-finger,



Three examples of "Reyrolle" protected type plugs and sockets

and in this way the catches are released. This device has also been developed by Reyrolle's and is called the "Andor."

Another useful development is the fuse-plug shown in 3. As will be seen, the fuse-cartridge is housed in a recess in the two-part moulded interior of the plug, and completes the circuit between a spring contact at the back of the moulding and the butt end of the plug contact, which just projects through the front plate of the moulding. Access to the fuse is obtained by removing this plate by undoing two screws from the open end of the plug. Each plug may have one or two fuses to give s.p. or d.p. protection.

This switch-plug-fuse combination has many uses; for instance, the 30-A size could be fitted with stop-pins or with an "Andor" attachment, and could then be used to control an a.c. supply to a cooker through a strong c.t.s. cable. For this special purpose, a socket for a small indicating lamp could be mounted on the outside of the plug casing. An advantage of an appliance like this, with its fuses for each individual point, is that it avoids the blowing of main fuses. A simple metal-clad s.p. fuse suitable for use on distribution-boards can also be made by short-circuiting the contacts at the back of a fuse-plug, and dispensing with the cable-gland.

Electrical Progress in Japan

THE Government of Japan made a survey in 1912 of the hydro-electric possibilities of the country. The report indicated that at times of minimum flow there was available potential power amounting to 5,018,000 kW, and that the available hydro-electric power plant sites which could be developed on a commercial scale numbered over 2,500. The Department of Finance states that the capacity of the power plants in Japan amounted to 4,193,623 kW in 1931. The total number of plants was 6,317, of which 774 were public supply and railway installations and 5,542 owned by individual industrial companies. The total power generated in 1929 by all public utilities, including railways, amounted to 13,312,000,000 kWh.

In Hokkaido, the northern island, there are seventeen hydro-electric and four steam undertakings and one hydro-electric station under construction. In the northern part of the main island of Honshu, north-east of Tokyo, there are thirty-three hydro-electric stations and four steam plants, and three hydro-electric and one steam station are under construction. Situated in central Honshu, near the large industrial centres around Tokyo and Osaka, are 143 hydro-electric plants and thirty-six steam stations, with thirty-three hydro-electric and three steam ones under construction.

In southern Honshu, west of Osaka and including the island of Shikoku, there are twenty-four hydro-electric plants, twenty-five steam plants in operation, and three hydro-electric plants under construction. In the southern island of Kyushu thirty-two hydro-electric and eleven steam plants are in operation, and two hydro-electric and one steam plant under construction. Japan proper has a total of 249 hydro-electric stations and eighty steam plants in operation, and forty-two hydro-electric and five steam installations under construction.

The Government and leading financiers have been active during the past year in trying to find some way to rationalise the power industry. One difficulty to be faced is the difference in frequency.

With a return to normal business conditions, the industry should show a decided improvement. Industrial developments are planned that will call for increased use of electricity. At present there is about 200,000 kW of surplus capacity in the vicinity of Tokyo, and 600,000 kW surplus in the country as a whole. This will soon be absorbed and plans already have been made for the construction of both hydro-electric and steam plants to meet the increased demand for electrical energy.

Electricity in Hat Making

IT is believed that the factory of Messrs. J. Moores & Sons, Ltd., Denton, Manchester, is one of the largest in the world devoted to the manufacture of felt hats. With the present equipment upwards of 30,000 hats per week may be produced. The installation is now wholly electrically driven, the 79 motors employed, varying from 2 to 25 h.p. individually, representing an aggregate of 550 h.p.

The supply, 400 V, 3 phase, was recently altered from d.c., as the result of the distribution change-over scheme of the Manchester Corporation electricity undertaking, so that the electrical installation can almost be regarded as an entirely new one. Synchronising with the supply change-over, an extension of 120 h.p. was made in the installation, replacing an old steam engine, which was the only remaining mechanical drive.

All the actual manufacturing drives are by s.c. motors, generally with direct-on starters, but owing to difficulties experienced in starting up on load in some cases auto-transformers have been installed. We saw Crompton Parkinson, Crypto, and Bull motors; Allen West auto-transformers, and Veritys air-break starters. Because there are two separate buildings, one on each side of the street, the installation is split. In one case an 800-A Airedale oil circuit breaker governs an ironclad distribution board, supplied by Dorman & Smith, Ltd., with twelve 100-A switch-fuses for power and nine 60-A units for lighting and heating. The smaller board has three 60-A switch fuses of M.E.M. manufacture, and is controlled by a 200-A Airedale breaker.

The works engineer spoke highly of the quality of c.t.s. cable used in acid- and vapour-laden atmospheres; in one shop where the roof has had to be changed after only three years' service, due to the deleterious effects of acids, the wiring has been in existence under the same conditions for ten years.

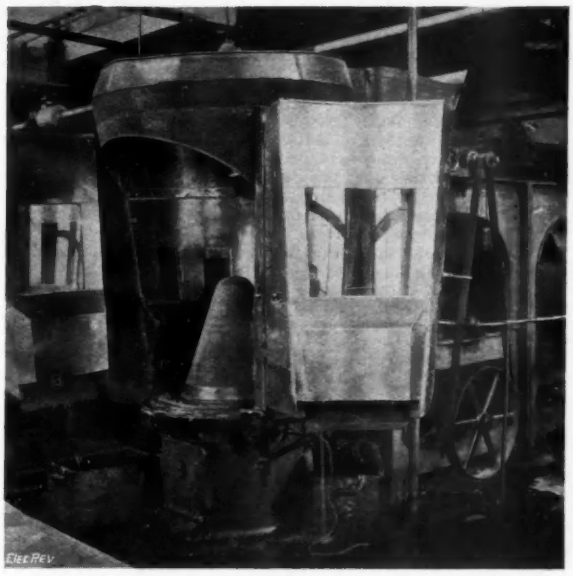
The Use of Electric Heat

Minor industrial heating operations represent about 14-kW loading. This is a small figure in view of the very extensive drying that is carried out, but, as the engineer said, it is a start. Competition with steam heating at ordinary tariffs would no doubt be out of the question, but we must not think in terms of ordinary tariffs. Industrial electric heating is increasingly being made possible by getting the consumer to extend his work over the whole day, so as to secure high-load-factor rates, and in every case with something more than satisfaction to the consumer.

Rabbit and hare fur is received as cut direct from the skin, after cleansing. Various qualities of the material are well mixed in a double-movement rotary machine; the outer casing revolves in one direction and the inner spiked member the opposite way. "Blowing" involves the extraction of all dust and dirt, and the separation of the pure fur from the heavier unwanted material in practically sealed chambers in which revolves at very high speed "picking" cylinders between larger perforated cylinders. Two 15-h.p. motors serve the mixers, blowing machines and the dust-extraction plant, in group drives.

How the Hats are Shaped

"Forming" is really the first process of hat making. The correct weight of fur for a hat is carefully spread out on a conveyor at one end of the machine and is carried through picking rolls, &c., to the far end, where from suspension in the air it is drawn on to a comparatively large perforated-copper revolving cone in a copper-lined chamber. The cone interior is in communication with a duct served by a 15-h.p. motor-driven fan, with the result that the fur is held tightly to the cone and actually forms a sheath over it. A 3-h.p. motor drives the conveyor and the revolving cone. The sheath or form, after being sprayed with hot water and the removal of the cone from the machine, is peeled off the cone and subjected to hardening operations—rolling up with others in cloth to tighten up the fibres in preparation for the next process, "planking."

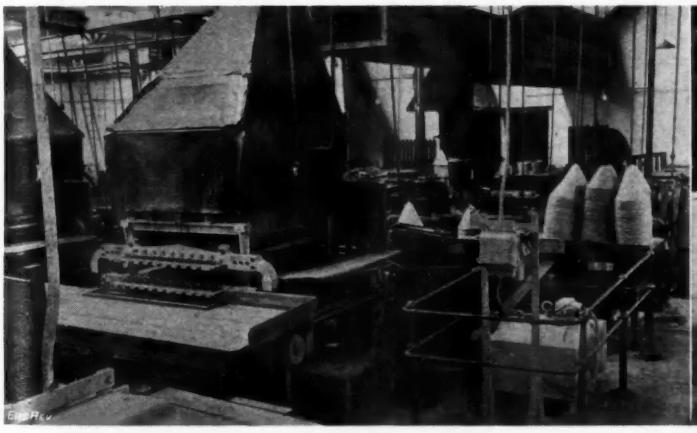


A forming machine from the cone end; cone chamber open

There are several types of machines engaged on this process, and in one the fur is subjected to the oscillating and revolving movements of series of rolls; but the object in all cases is to further tighten up the fibres, considerably thickening the form so that it more nearly resembles what is generally known as felt, and at the same time reducing the size of the form. About 100-h.p. of motors is installed in this section, and we saw some 20-h.p. motors group driving up to six machines.

In the shaving room the hat is put on conical blocks revolving at high speed, and all the long hairs and rough nap are cut off by sandpaper. A fair pressure is put on the cone during this process, and a 20-h.p. motor is necessary to drive the few machines installed. On proofing machines the necessary liquids, varying according to the type of hat, stiff or soft, are forced through perforated revolving cones and into the felt passing between the latter. A 20-h.p. motor drives these machines, the proof-mixing equipment and the spirit-recovery apparatus. The next process, blocking, is the essential part of hat making. It is all hand work and carried out by highly skilled craftsmen, the form being very frequently submerged in boiling water during the process. During dyeing the hats are circulated in boiling liquid in machines group driven by a 10-h.p. motor.

It is impossible to deal with the very many finishing processes. Many of them are hand operations, but something like 100 h.p. serves hydraulic presses, lathes, &c., all concerned in this work. Trimming processes involve ordinary sewing operations for the interior and exterior bands, bows, &c., all on power-driven machines.



The end of a line of planking machines with a 20-h.p. driving motor

A battery of motor-driven fans serving forming machines

Book Reviews

Practical Cable Jointing. Pp. xvi+215; 332 illustrations. London: W. T. Henley's Telegraph Works Co., Ltd. Price 5s. net.

This extremely handy volume combines within its covers the material contained in a series of pamphlets which Henley's have issued from time to time. It is frankly a "Henley" publication, but this does not detract from its value as an up-to-date, eminently practical manual upon a most important branch of electrical work. It has evidently been produced by people who know the job from marking out the road to covering in and making good, and their experience is imparted to the reader in the minimum number of words and the maximum number of illustrations—which is just what the jointer wants.

Steam Boiler Construction. By E. G. HILLER. Pp. xi+245; figs. 152. Manchester: National Boiler and General Insurance Co., Ltd. Price 3s. 6d.

It has been found necessary to reprint the enlarged third edition of the company's rules, which includes notes on materials, construction, and the design of boilers and unfired pressure vessels, and the opportunity has been taken by Mr. Hiller, who is the company's chief engineer, to revise all the formulæ and other contents. The section on water-tube boilers has been rewritten, but as practice is in a somewhat fluid condition this subject is dealt with on general lines, without going into details as has been done in the cases of Cornish and Lancashire type boilers. Illustrations of typical modern steam-generating units have been included.

Proceedings of the 1931 Session of the International Conference on Large High-Tension Electric Systems. In three volumes, 2,500 pages, with 600 figures, photographs, and diagrams. Published by the Conference, Avenue Marceau, 54, Paris. Price 380 fr.

The three volumes contain in full the 100 papers which were presented for discussion and an account of the debates on six full days. Volume I deals with the construction of generating and transforming equipment; Volume II with the construction, insulation, and maintenance of transmission lines; and Volume III with network operation and protection. The whole represents an exhaustive review of the experience gained all over the world in thirty-six different countries by the 738 members of the Congress.

* * *

Shorter Notices

"Thermionic Emission—A Survey of Existing Knowledge with Particular Reference to the Filaments of Radio Valves." Pp. x+106; 11 figs. London: Stationery Office. Price 2s. 6d. net.—With the object of facilitating further study the Radio Research Board of the Department of Scientific and Industrial Research has arranged for the issue, as "Special Report No. 11," of a comprehensive survey of all the main results, obtained in researches in the various branches of this subject. There is a lengthy bibliography which includes references to all the important papers published up to December, 1930. The report was prepared at the National Physical Laboratory by Dr. W. S. Stiles.

"The Problem of Incentives in Industry." By G. H. Miles. Pp. 56. London: Sir Isaac Pitman & Sons. Price 3s. 6d.—These lectures given at the London School of Economics under the Heath Clark bequest to the National Institute of Industrial Pyschology discuss the root problem of industry, how to supply adequate incentives to obtain the maximum effort from each worker.

"Muscular Work, Fatigue and Recovery." By G. P. Crowden. Pp. 74. Illustrated. London: Sir Isaac Pitman & Sons. Price 3s. 6d.—Three lectures given during 1931 at the London School of Economics under the auspices of the National Institute of Industrial Psychology; a study for employers, works managers and foremen.

"Electrical Machinery and Apparatus Manufacture." By Philip Kemp. Vol. VII. Pp. 1604-1820. London: Sir Isaac Pitman & Sons, Ltd. Price 6s.—This is the final volume and covers h.p. switchgear (by W. A. A. Burgess) and a.c. motors and generators (by R. Marsden).

"The Nomogram," by H. J. Allcock and J. Reginald Jones. Pp. 209; figs. 75. London: Sir Isaac Pitman. Price 10s. 6d.

"Taurus Bronze Castings." Pp. 52; illustrated. Huddersfield: David Brown & Sons, Ltd. Price 1s.—This booklet is well out of the general rut of trade publications. It is a practical treatise from the company's research department on the composition, properties, manufacture, testing, and applications of "Taurus" bronze castings.

"Acoustical Engineering," By W. West. Pp. xi+338. Illustrated. London: Sir Isaac Pitman & Sons. Price 15s.

"Graphical Geometry." By E. N. Digweed. Pp. 282; figs. 230. London: Longmans, Green & Co., Ltd. Price 4s. 6d.—In this book the author has taken special pains to make the subject as clear as possible and the text is aided by excellent diagrams.

"Recent Advances in Atomic Physics." By Gaetano Castelfranchi. Translated by W. S. Stiles and J. W. T. Walsh. Vol. I: Pp. 410; figs. 79. Vol. II: Pp. 372; figs. 111. London: J. H. Churchill. Price 15s.

"Testing Radio Sets," by J. H. Reyner. Pp. 207; figs. 95. London: Chapman and Hall. Price 10s. 6d.

"Theory of Dielectrics," by A. Schwaiger. Pp. 480; illustrated. London: Chapman and Hall. Price £2.

"Technical Data on Fuel," edited by H. M. Spiers. Pp. xv+302; tables. London: British National Committee, World Power Conference. Price 12s. 6d.

"Rubber Information." Pp. 143. London: Leonard Hill, Ltd.—A complete guide giving the manufacturers, buyers, producers, suppliers of plant, plantation companies, trade names, bibliography, statistics and a technical dictionary.

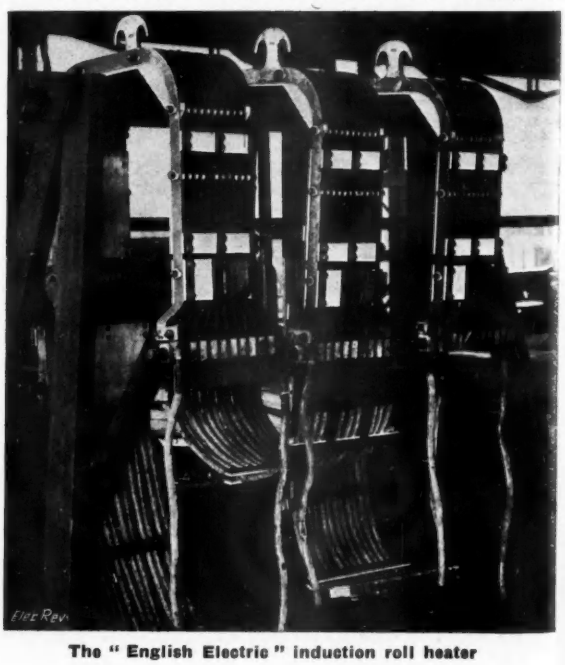
Induction Heaters in Steel Rolling

IN the report of the I.E.E. summer tour which appeared in our issue of June 10th, 1932, we referred to the use at the steel works of Thos. Firth & John Brown, Ltd., of an electrical heating device that brings the rolls of the mills up to the correct temperature before operation. This device is the invention of Mr. K. Younghusband, the chief engineer to Messrs. John Summers & Sons, Ltd., as a result of his own experience in the manufacture of steel sheets, and from him we have obtained further particulars and the accompanying photograph which shows three heaters of 30-in. rolls stored on a stand; the middle heater is in the closed position, and the two outer heaters are in the open position. The manufacturers are the English Electric Co., Ltd.

Figures which we have seen of tests made under working conditions show them to have been very satisfactory, and the heaters appear to meet a real need in steel rolling works besides providing a demonstration of a practical application of electric heat in industry. The need for a device of this kind lies in the fact that some 80 per cent. of roll breakage is due to stresses caused when heating up after a shut-down during the week end. External heating of the rolls by other methods produces an undesirable temperature gradient through the roll. The English Electric induction heater is designed to raise the temperature gradually and evenly throughout the roll and to ensure correct heat distribution under operating conditions.

The heater consists essentially of copper strips wound on edge with the lower ends connected, and braced together and supported on two rods placed over but clear of the rolls, so that it can be used when the latter are revolving. The energy required is from 50 to 60 kWh per hour to raise the temperature of a pair of 42 in. by 30 in. diameter rolls to 570 deg. F. in twelve hours. A 120-kVA transformer is used for stepping down the works voltage from 600 to 110 V.

Experience in several mills has shown that savings up to 1s. 4d. per ton rolled have resulted from the reduction in roll breakages alone and that if only two rolls at from £100 to £150 each were saved in a year this would be more than enough to recoup the expenditure on the heating installation. Moreover, the first shift on a Monday morning gives an output nearly equal to that of any other in the week and there is also an appreciable saving in scrap. The heater is used only once a week, and electricity, taken off-peak at 2d. per kWh, costs only 2d. per ton for sheets rolled. In contrast with non-electrical systems of roll heating, the induction heater requires no attendance, and no power for revolving the mills and auxiliaries, and its maintenance costs are said to be negligible.



The "English Electric" induction roll heater

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

The Effects of Electric Shock

I have only just seen your issue of July 29th, but I hope that the following personal experience may interest " E.A.M."

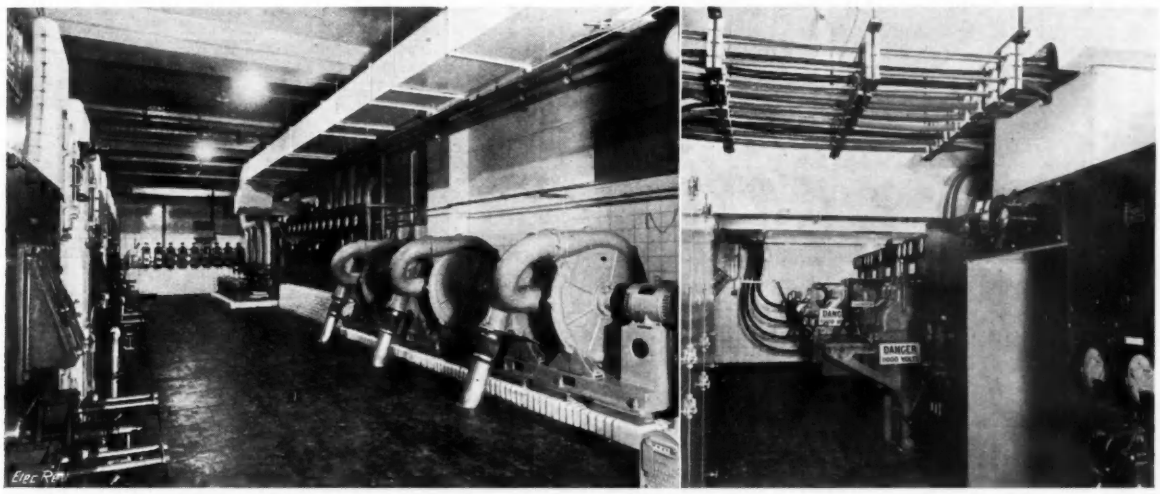
Standing on a fairly new cement floor, in a moment's forgetfulness I touched with one hand a bared cable end on which was a pressure of 10,000 volts to earth. The supply was 25 cycles a.c. I felt no pain in the hand, but was conscious of a terrific roaring in my ears, and a feeling as if my heart had stopped. I could see my surroundings very dimly for a second or so, and was able to realise what I had done, but I had lost consciousness before reaching the ground.

I was brought round after about five minutes, and at first felt merely a comfortable sleepy feeling, but this was followed by violent beating of the heart.

I was able to stand in about a quarter of an hour, and walked to the railway station. There was a slight burn on one finger, and burns on the soles of my feet over the nails in my boots. Cramp in the calves of the legs, and a pounding heart prevented my sleeping much that night, but I was able to resume work next day.

London, S.E.3, *August 8th.* C. A. N.

In November last I was unfortunately suspended in mid-air with hands grasping phase and neutral respectively of a 230-volt overhead line.



The boiler house (showing combustion fans and pumps with common drive) and the e.h.p. equipment in the sub-station at Unilever House (see page 212)

My immediate sensations were an agonising pain in my throat and head—my head felt as though it was being drawn backward and downward, and my feet and legs upward to meet it. My vision was clear but fixed, and I could hear all that was going on in the streets below me, but my speech was completely gone; I could not even mumble.

I cannot say how long I was suspended; naturally it seemed ages, but my last feelings before losing consciousness were the most agonising pains I ever wish to feel; every muscle felt as being torn out of my body. I was in hospital ten days, back to work in fourteen days. The only after effect, apart from injury due to dropping to earth, was nervousness when in close proximity to a live wire, and this eventually passed away. The only burns were two on each hand at the extreme edge of the palm.

Brighton, *August 8th.* W. M.

E.H.P. Switchgear

In the last issue of the ELECTRICAL REVIEW there appears in the advertisement of a well-known and very competent switchgear manufacturer a statement to the effect that *all* his circuit breakers are subjected to a rupturing capacity test!

Surely this cannot be necessary! If it is, I fear that electricity, while it may become abundant, will never be cheap because a circuit breaker, even of so low a rupturing capacity as 100,000 kVA, could not be profitably sold for less than £350, bearing, as it would of necessity do, the cost of such testing.

Wallington, *August 6th.* B. N. D.

Installation Testing

More in sorrow than in anger I write to enter a protest against the derogatory remarks about our " Megger " insulation tester which occur in an article by Mr. F. Peake Sexton on " Installation Testing " published in your issue of July 22nd.

Mr. Peake Sexton says " Enough has been said to discourage faith in the ' Megger ' ". This is rather a shock when for over thirty years the electrical industries of the world have used " Megger " insulation testers and still continue to do so; can it be that the confidence in these instruments has been misplaced?

It is true that a " Megger " testing set will not reveal all the shoddy work concealed under the floorboards by an incompetent and perhaps dishonest man (I will not call him a workman), but the insulation test does give valuable, and indeed vital, information.

Poor " Megger " testing set; it has been such a good servant for so many years that it is now blamed for not doing the job which should be done by the inspector.

My recipe for obtaining and retaining a good electrical installation is an honest contractor, a fair price, and a careful inspection and test followed by periodical insulation tests.

W. A. VIGNOLES,
Managing Director, Evershed & Vignoles, Ltd.
London, W.4, *August 5th.*

" Suggestions Invited "

Being a reader of your journal and noticing in your issue of the 5th instant an article marked " Suggestions Invited," I venture to suggest that the following should be considered by manufacturers :—

The fitting of a white opal glass dial to small electric clocks with a lamp behind so that the time can be easily ascertained at night-time

Flimwell, *August 6th.* S. R.

Lighting from Power Points

Any supply authority with a lighting tariff and a power tariff at different rates is, we presume, subject to the fraudulent use of electricity for lighting at power rates, by means of using a standard lamp from a power plug.

I am wondering whether any of your readers can suggest any inexpensive means of checking this kind of fraud by consumers, and also whether they have instituted any prosecutions on this charge.

It is not desirable to change the existing tariff at present.

My view is, of course, that if the practice can be proved, it is actionable at law, and that if examples are made of one or two consumers, it might do much to reduce the practice, although there is very great difficulty in establishing the proof.

P. O. WITTEY,
Engineer and Secretary,
August 5th. The Seaton & District Elec. Light Co., Ltd.

Our Poor Publicity

It occurred to me that the cutting (quoted below) which is taken from the current issue of the *Advertiser's Weekly*, might be of interest to you in view of the recent discussions, both in your columns and elsewhere, on the subject of Electricity Sales publicity :—

" The fact that the Gas Light and Coke Company holds the contract to light Regent Street, ' The first street in Europe,' and others equally famous until 1947, certainly gives them something to shout about, and they have made the most of it. In my opinion, bearing in mind the product to be sold, it was almost a perfect advertisement—and I only qualify it because, like everyone else, I have no notion what a perfect advertisement is.

" The illustration was delightful, the layout and typography distinctive, original, and arresting, and the facts were inter-

estingly and briefly related. Gas is so often associated with Sherlock Holmes and wax flowers. Nothing could have demonstrated more abruptly and effectually that it plays a big part in social services—even in these days of candles—than this distinguished announcement. I wish suppliers of electricity would jump to it as effectively and as neatly. But they were always a trifle mediæval in their outlook."

It would seem that at least one section of the lay community holds a very poor opinion of the advertising efforts of the supply undertakings!

London, W.10, *August 6th.* LESTER E. HOGGAN.

Swimming Bath Lighting

Recent reports in the Press lead one to believe that the underwater lighting of swimming baths is of recent introduction.

As a matter of fact, I can claim to have been a pioneer of this system, having carried out installations for the Viscount Ednam, in 1928, and also fitted the Prince of Wales's bath at Fort Belvedere. I was given a free hand by the Prince, as I had experimented for over two years on the scheme, and I accordingly had a model of a bath made to scale for the Prince's approval.

For bath lighting underwater illumination is superior to any other form, and in the case of an indoor bath of fair dimensions it is possible to read even small print without the aid of overhead or side lights, and the light is diffused to such an extent that almost no shadow is observable. In one installation that I carried out the bath is of the outdoor type, and very beautiful effects are produced by the rippling surface of the lighted bath reflecting on to a dry stone wall on which are growing vari-coloured rock plants. A lily pond lighted in this manner is another beautiful ornament, as the foliage and flowers are X-rayed as it were, and the goldfish sparkle as they dart about.

I am of the opinion that this type of lighting would be in the interests of safety in public baths, as there have been cases of persons being found on the bottom of the bath, and there would be a much better chance of seeing them. With fittings which I have designed it is not necessary to lower the water to change a lamp; they are suitable for wattages up to 1,500, and the spread is 170 deg., being obtained by prisms, although the glass on the inside of the bath is bulbous and has a smooth surface. Condensation is eliminated and the depth of the fittings varies with the section of the bath to be lighted. F. W. MAYNARD.

Sedgeley, near Dudley, *August 2nd.*

Electricity on the Poultry Farm

I shall be pleased if you will let me reply in your valuable columns to Mr. A. A. S. Roscoe's criticism in your issue of July 22nd to my article "Electricity on the Poultry Farm," published in your issue of June 24th.

In the article I gave some poultry breeders' views of the drawbacks of the lighted brooders after they had tried them. Perhaps you will now let me give my own views of these drawbacks. Some years ago I thoroughly tested out the system of rearing chicks in brooders heated by luminous electric lamps, keeping them under observation night and day. I found that the chicks did not rest comfortably but dozed standing up. Swellings appeared by the chicks' eyes. Chicks would start scratching in the brooder, causing disturbance to the others.

Lastly and most important: it is well known that most of the poultry diseases are spread by the chicks pecking the droppings. As there is always a bigger proportion of these droppings under the brooder, it is certainly wrong to give a brilliant light in the brooder to encourage the chicks to peck the droppings. At the recent Royal Lancashire Show I gave interested poultry keepers ample proof that chicks peck the droppings in a lighted brooder. This was done by opening the door of a dark brood chamber, when the chicks instantly started pecking the droppings, which were lighted up by the door being open.

I will leave the electrical engineer to judge which is the most efficient type of heating unit: (1) a batch of exposed carbon lamps; or (2) mica-wound elements working at black heat (with 12-point temperature control by the operation of one knob) clamped to an aluminium plate with an asbestos-covered top, suspended above the chicks.

Chertsey, *August 9th.* GEORGE T. CHURCH.

The Curse of Parochialism

Will Mr. Sayers kindly explain how parochial work becomes a curse instead of a benefit (ELEC. REV., August 5th)? His review, like the Labour Party Manifesto, is merely an irritating repetition of the untenable claims of bulk supply and the grid.

Whether control be bureaucratic or parochial the first essentials are an efficient, automatic prime-mover, the most economical fuel, and the minimum of local distribution. Local production eliminates transmission.

The parochial i.c.e. station with gas as fuel will produce electrical energy at a cost of, say, 0.15d. for "fuel" (*a* charge), and, say, £3 per annum, or 2d. per day, for "All Other Charges" (*b* Charge).

With parochial fuel gas the consumer would get 100,000 B.th.u. for, say, 1½d., instead of 3,412 B.th.u. for ¾d. per kWh from the grid, hygienic advantages gratis, and 96,588 B.th.u. to balance the difference in efficiencies.

The parochial engineer, with the necessary disregard for "wiring rules" (which are necessary only for illogical methods), would use concentric cables, outer uninsulated and affording all the mechanical protection necessary, 250-0-250 volts, two in series (not the absurd "three-wire"), and every portion of charged conductor hermetically sealed within earthed metal covering. He would plug-in to dead metal, the locking action making contact, and distribute at 100 per cent., instead of 80 per cent. efficiency.

The parochial area would be free from smoke and fumes; chimney breasts would disappear from our houses with economy of bricks, labour, and space; the hygienic vacuum cleaner would be in every house, compulsorily; and "ideal houses" a fact instead of a flight of fancy.

It appears to me more like a blessing than a curse, but one never knows.

London, S.E.12, *August 9th.* E. G. PINK.

Suggested Electrical Engineers' Club

Many people have complained of the lack of facilities for an engineers' meeting place in London, particularly since the Engineers' Club has closed down. It is suggested that an opportunity now occurs, with the vacation by the B.B.C. of part of the I.E.E. building (if not already re-let), and that our Institution should extend its social activities by converting some part of the vacant premises into a restaurant and club-room or rooms, where we poorer members could forgather and have truly informal meetings. It would be a place to which to take our professional friends to lunch or dinner, where we could meet old colleagues over a coffee or a glass of water, or a place where provincial members could stay when in town—in short, an Electrical Engineers' Club.

It could, and should, be so constituted that it would in no way adversely affect the chartered ideals of the professional status of our Institution, but would have to depend upon it for financial support.

Rumours have been handed round that the "powers that be" are on the look-out for a site to build an Electrical Engineers' "Temple," in place of our present home, but I submit that some such development as is suggested above would supply a more pressing need.

It is hoped that members who approve of the scheme, or otherwise, will express themselves in writing, so that I may have some idea what support an official proposal would be likely to receive.

Ruislip, *August 9th.* REGINALD N. PEGG.

Off-Peak Water Heaters in Amsterdam

We learn from the *Electrical World* that nearly 25,000 electric water heaters are in use on the Amsterdam, Holland, electric lighting and power system, and that about 84 per cent. of them are rented.

Forty-litre (9 gallon) heaters seem to meet most of the hot-water requirements, 65 per cent. of those in use being of this capacity. However, 21.5 per cent. are 80-litre, and 8.4 per cent. 150-litre units. The load ranges from 13.7 watts per litre for the 40-litre size to 13.2 watts per litre for the 250-litre size. The heating elements operate on 220 V, 50 cycles. The prices of the heaters without accessories range from about $40 for the 40-litre size, to $106.50 for the 250-litre tanks, and installation costs add about $12 and $16, respectively, to these prices.

Off-peak power is used chiefly for water heating. A time switch connects the heaters from 11 p.m. to 7.30 a.m., and from 12 noon to 2 p.m. daily, and from 12 noon Saturday to 7.30 a.m. Monday. During the summer the off-peak periods are shifted one hour later. Off-peak service is charged at a rate of 0.8 cent per kWh. However, if the hot-water requirement is larger than usual the consumer can connect the units at other periods and pay 1.6 cents per kWh during such usage. Synchronous clocks in the meter gear perform the automatic switching and also set the "off" and "on-peak" rates.

To calculate the size of water heaters required, it is assumed that the consumption of hot water in the kitchen averages 5 litres per person per day, and reaches a maximum of 8 litres. For baths it is assumed that about 60 litres at 80 deg. C. is required per person per bath. Water is heated to 80 deg. C. and normally delivered at the same temperature to the taps.

Load curves show that between 11 p.m. and 7.30 a.m. the load has been increased nearly 50 per cent., giving a minimum night load of 19,000 kW instead of 13,000 to 13,500 kW. Furthermore, the 12 noon to 2 p.m. drop of nearly 10,000 kW has been eradicated. It is true that the day peak around 5 p.m. has increased about 25 per cent., but this is due chiefly to other day loads that have been added in the three-year interval represented by these curves.

The revenue from "night current" at 0.8 cent per kWh was upward of $40,000 in 1928, $64,000 in 1929, $144,000 in 1930, and about $288,000 in 1931. For the greater part this revenue came from off-peak heaters, principally the 40-, 80-, 100- and 250-litre tanks, the yearly consumption of which is estimated at 1,450, 2,000, 3,000 and 4,800 kWh respectively. Investigations are being carried out on about 100 different heaters.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

The " Marchal " Pole-piece Setter

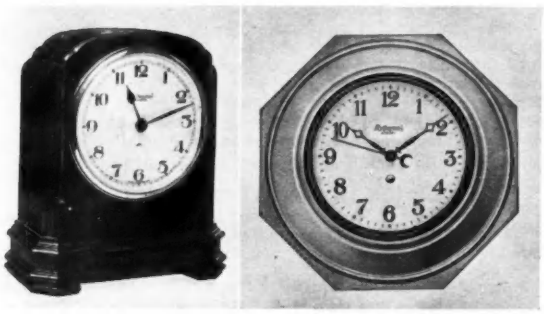
Electrical repairers often experience difficulty in forcing the pole pieces of motor vehicle dynamos and engine starting motors into their proper places against the yoke, and at the same time in pressing the field cases into their correct shape, as the screws through the carcase are often inadequate, even when a special screwdriver is employed. To meet the difficulty MR. C. V. DESIDERIO, 143, Whitfield Street, W.1, has recently introduced an expanding pole-piece setter and coil shaper known as the " Marchal." The tool works on the toggle-joint or parallelogram principle and is claimed to be extremely powerful. It can be employed on any machine where the outside diameter of the armature is between 2¼ in. and 5½ in. It is claimed that once forced into place, the pole pieces can be fixed with the usual screws without damage and without special tools.

Electric Clocks

A new range of electric clocks is now available from THE ROTHERMEL CORPORATION, LTD., 1, Willesden Lane, N.W.6.

These clocks are all provided with 5-in. dials with the exception of the " Firefly Alarm " model. This has an illuminated translucent dial, which is lighted from behind by a small lamp controlled by a switch so that it can be turned off in daylight. The electric alarm continues until switched off. This clock is 5 in. high, 4 in. wide, and 2¼ in. deep, and has a dial 3¼ in. in diameter; its price is 45s.

The two clocks illustrated are the kitchen model and the " Glenmora." The kitchen model has a rust-proof case with an outside diameter of 8½ in. and depth of 2¼ in. It is priced at £2 7s. 6d. The " Glenmora " is 8½ in. high, 7½ in. wide, and 3½ in. deep, and sells at £3 12s. 6d. in oak. Other types available are the " Ravenswood " at £1 15s., the " Hawthorne " at £3 12s. 6d., and the " Sherwood " at £4 2s. 6d. All models are designed to run on a.c. mains at 200-250 V., 50 cycles, and have a loading of 2 W.



The Rothermel " Glenmora " and kitchen clocks

A New Electrical Resistance Alloy

Until recently, the commercial use of metallic electrical resistance alloys has been limited to 1,150 deg. C. by nickel chromium alloys. Above 1,150 deg. C. only refractory non-metallic materials have been available.

" Kanthal," a new metallic electrical resistance alloy, is capable of resisting very high temperatures.

It will withstand up to 1,325 deg. C. for long periods, and possesses a much higher specific resistance, and lower specific gravity, than the nickel chromium alloys, and, when in the presence of sulphur, is attacked only to a very small degree.

Produced in strip, wire, castings and tubes for pyrometer sheaths, it is suitable as elements for all types of furnace work regardless of design, and has already been used successfully in furnaces for hardening high speed steel, glass melting, heat treating of stainless steel, case hardening, enamelling, pottery, sintering tungsten carbide, laboratory work, and the like.

In addition, this alloy should greatly appeal to the domestic appliance maker as elements for radiators, fires, irons, kettles, &c. As castings, " Kanthal " has aroused considerable interest for heat and sulphur resisting purposes.

The various qualifications of the three individual grades are as follows:—

" Kanthal A1 " is produced only in strip, and can be used up to maximum temperature of 1,325 deg. C.

" Kanthal A " is produced only in wire, with a maximum temperature of 1,250 deg. C. It offers scope for " brighter fires," and can be used with advantage in those of the reflector type.

" Kanthal D " is produced in wire and tape. Its maximum temperature of 1,050 deg. C. is as high as is usually required for many purposes where 80/20 per cent. nickel chromium is used. It is cheaper than the latter, and this, together with its higher specific resistance and lower specific gravity, admits of a considerable economy.

The introduction of this new metallic element, to work at high temperatures, has awakened considerable interest in the world of heat treatment. As compared with elements of the non-metallic type, the metallic element gives a very much wider range and more economical design of furnace, which will permit of electrical heat treatment being employed in many trades which hitherto have found it impossible, owing to the form, or design, of furnace which was necessary, when non-metallic elements were used. It is supplied by MESSRS. HALL & PICKLES, LTD., Sheffield.

" Davenset " Radio Components

In March last MESSRS. PARTRIDGE, WILSON & CO., Evington Valley Road, Leicester, announced that they were about to introduce a range of mains transformers and power smoothing chokes for radio and industrial purposes. These components are now being made in compliance with the recommendations of the British Standards Institution and the Institution of Electrical Engineers, and have been provisionally patented (No. 3827/32).

A " Davenset " mains transformer

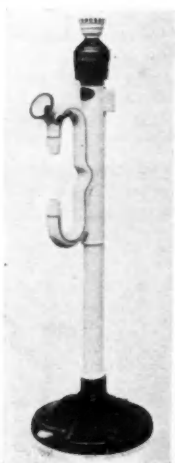
The class A No. 12 transformer, which is designed for use in conjunction with the new Westinghouse metal rectifier, type H.T.9, is suitable for a 200/250-V 40/100-cycle input, and will give an output of 180 mA at 240 V or 4 A at 2×2 V. The core is made up of insulated " Stalloy " laminations, 0.014 in. thick. The " Bakelite " bobbin is wound with copper wire rated at 1,000 A per sq. in.

Transformers and chokes up to 250 W in size have their core clamped by means of pressure cast non-ferrous metal frames. Recesses in the inner sides allow the outer core laminations to fit snugly and avoid slipping. The frame's feet provide three fixing positions, the whole being surmounted by a flat connector plate with moulded internal flanges which extend to the edges of the bobbin and protect the tapping wires, each of which passes through a groove moulded within the cover.

Small brass connectors are sunk within the moulding, so that only the connecting screws are visible at the top in their recessed holes, so avoiding risk of short circuit and allowing the connections to be sealed.

A New Hand Dryer

At the recent health exhibition of the Royal Sanitary Institute at Brighton a new British hand dryer was exhibited. This apparatus, manufactured at Willesden by the LANCASHIRE DYNAMO & CRYPTO, LTD., has the concentrated heat efficiency of similar American machines, and incorporates an attachment for face drying and an arrangement whereby the air passes through a disinfectant pad and agreeably perfumes the hands and surrounding atmosphere.



The " Crypto " electric hand dryer

The dryer is operated by foot pressure on the pedal of a foot switch, and is so constructed that immediately the pressure on this switch is released the current is automatically switched off. Under normal conditions the hands can be dried in about twenty seconds.

The apparatus, which has a loading of about 2.4 kW, is designed for ordinary wall mounting or as a pedestal model; there is also a multiple type for factories. The price of the standard wall model is £20 complete; for the pedestal type there is an extra cost of £2. We know from the actual experience of our friends overseas that the saving in towels and laundry more than pays for the apparatus in a very short time, and the cost of maintenance of this machine over very many years is nil.

The dryer can be used in hospitals where it prevents all possibility of contagion or infection, and it can conveniently and economically be installed in hotels, restaurants and schools. Demonstrations are now being given at the company's office, 94, Petty France, S.W.1.

A Portable Power-factor Finder

MESSRS. ELLIOTT BROS. (LONDON), LTD., ask us to state that the patentee of the instrument described under this heading in our issue of July 29th (p 162) is Mr. G. F. Shotter.

New Prepayment Meters

THE METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester, has just announced two new types of prepayment meters. The "RU" fixed-charged meter has its principal use in collecting instalment payments for wiring, cookers, fires, rent, &c. These meters are made with ratings of 2½, 5, 10, 20 A, and the overall dimensions are 10 in. high, 8 in. wide, and 6½ in. deep, the weight being 15 lb.

The prepayment mechanism is of the type "NA" meter pattern. The price change device in type "RU" meters is fitted at the top left hand corner of the meter register. The kWh consumed feature consists of a type "NE" meter element, which gives important advantages in reduction of size and weight.

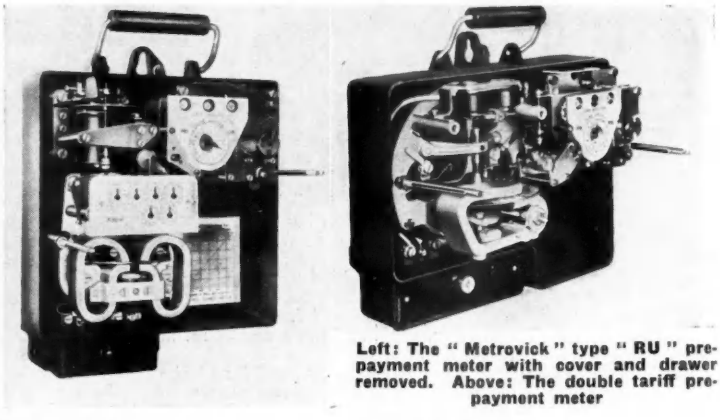
The fixed charge is collected by a Ferraris motor shown at the top left-hand corner in the illustration, coupled to the prepayment mechanism through a differential gear. Either of two gear ratios can be supplied, for rents ranging from 3d. to 3s., or 6d. to 6s. per week respectively, the speeds being adjusted to a stop watch between 12 and 144 r.p.m. to suit any desired tariff by means of a screw shown in the extreme top left-hand corner, the correct speed for any desired charge being obtained from a chart mounted within the meter.

The other new type of meter is a double tariff model patented by Mr. Fawsett, of the Newcastle Electric Supply Co., Ltd. It does all the duties of a prepayment meter, and also gives the consumer the benefit of a lower tariff when the load exceeds a certain amount.

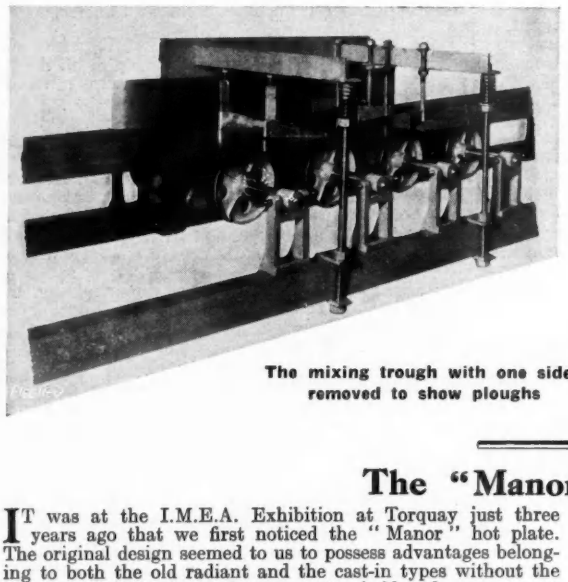
It consists of the well-known type "NA" prepayment meter with the addition, between the meter and the prepayment switch, of a sliding gear change mechanism operated by a small relay connected in series with the current coils, and mounted inside the meter. Standard double tariff meters are fitted with gears arranged to charge for the power load one-fourth the rate charged for the lighting load.

Double tariff meters are supplied with ratings of 2½, 5, 10, and 20 A, and in standard meters the relay brings into operation the lower prices per kWh directly the load reaches limits as follows:—Rating in ampères, 2½, 5, 10, 20, and 40; load in watts, 100, 200, 400, 800, 1,600, respectively.

If required, special meters with higher change-over load limits can be supplied, but the figures given above cannot be reduced. Overall dimensions are the same as for type "NA" prepayment meters, and the weight is approximately 18½ lb.



Left: The "Metrovick" type "RU" prepayment meter with cover and drawer removed. Above: The double tariff prepayment meter



The mixing trough with one side removed to show ploughs

Coal Blending

A simple method of blending coals before feeding to the furnace hoppers has been placed on the market by the STEEL BAND CONVEYOR AND ENGINEERING CO., LTD., Barker Street Works, Parade, Birmingham. Mixing in any desired proportions is carried out by means of stationary ploughs riding just clear of the surface of an endless steel belt. These ploughs mix the upper and lower layers of different coals, which may be fed from any number of chutes on the top strand of the steel belt, where it falls between hard steel skirting boards floating on springs. The lower strand of the belt may also be used as a conveyor.

Correction

On page 194 last week we stated that the "Wemco Major" voltmeter switch is suitable for mounting on the back of panels from 5- to 2-in. thick. This should read from .5 to 2-in.

Soldered Zinc Cups

MESSRS. MCLEOD & MCLEOD, 329, High Holborn, W.C.1, are now making zinc cups for dry batteries which are machine soldered instead of hand soldered. The price is competitive with the imported article and it is hoped to reduce it still further. As some 1,000,000,000 cups are used annually for dry batteries in this country alone, there should be a considerable demand for a cheap machine-made article.

The "Manor" Hot Plate

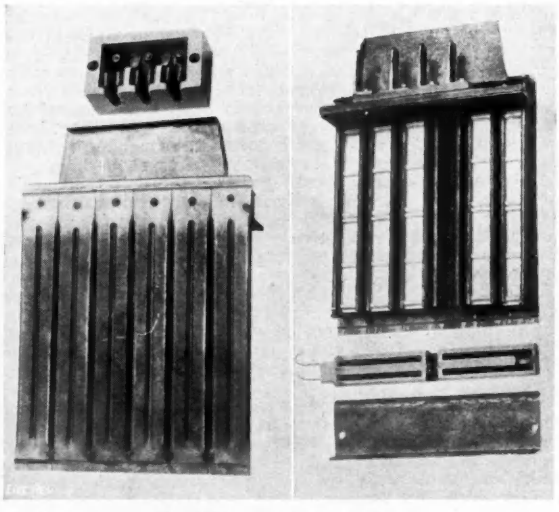
IT was at the I.M.E.A. Exhibition at Torquay just three years ago that we first noticed the "Manor" hot plate. The original design seemed to us to possess advantages belonging to both the old radiant and the cast-in types without the attendant drawbacks, and to present a bold endeavour to get away from stereotyped design.

In the recently introduced model the tubular form of plate has given way to a flat-channelled chromium-steel plate, the flat upper surface of which gives a greater contact area for heat transmission. The accessibility for element replacements is still a feature of the design. The non-corrodible terminals are of the plug-in type.

In view of the importance of getting first-hand information of the behaviour of this kind of apparatus under ordinary working conditions we asked a supply engineer who has had experience with both models on his system to give us his candid opinion on their performance, which he has done in the following words.

"This plate successfully fulfils the dual purpose of grilling and definitely boiling. The construction of the plate is robust; at the same time, owing to the small weight of metal and refractory present, the heat inertia is very low, and the efficiency is in the region of 50 per cent., which is exceptionally high for this class of plate. The tests were from cold and the quantity of water used was three pints.

"The performance of the latest 'Manor' plate is a great improvement upon previous models. Out of some hundreds of these plates which have been under observation in working conditions over a period of eight months less than 2 per cent. have failed. Even this small percentage will probably be reduced, as a definite cause has been found for one type of breakdown which was of an electro-mechanical nature, and with the correction of this weakness the percentage failures should drop to about 1.2 per cent. Should this plate prove the success that its present performance indicates it will be an enormous help to the designer of the small cooker."



The "Manor" boiling plate

Left: Top and connector unit. Right: Underneath, with view of element and cover plate

German Electrical Exports

IN our leaderette pages last week we gave figures showing how the German cable industry had fared during recent months. It is now stated that the total electrical exports from Germany during the year 1931 were about 16 per cent. less in value, and 12 per cent. less in weight, than during 1930. This, says Dr. Ing. G. Becker, in *Elektrotechnische Zeitschrift*, is the first time that a decrease in electrical exports has been shown since the stabilisation of the mark.

From the course of business during the current year it is estimated that the electrical exports from Germany for the year 1932 will not exceed 350-400 million marks, or about the level of the year 1925 or 1926. On the other hand, the annual reports of the large electrical firms in Germany indicate that the proportion of total turnover represented by export business increased greatly during 1931.

The table below, comparing the electrical exports of various countries for 1930 and 1931, shows a decline of only 16 per cent. for Germany compared with substantially greater decreases in all the other countries excepting France, but whereas the decline in our exports is, in Dr. Becker's opinion, more than balanced by the strength of our internal market, the German decrease is particularly serious because it relates to an increased proportion of the total turnover and because the export of valuable manufactured goods is specially necessary to Germany as a debtor nation.

VALUE IN MILLIONS OF MARKS.

	1930.	1931.	Decrease %.
Germany	629	530	16
United States	535	382	29
Great Britain	375	227	39
Holland	180	121	33
France	85	75	12
Sweden	78	58	26
Switzerland	76	57	25
Austria	51	39	24
Totals	2,009	1,489	26
German exports as per cent. of above total	31%	36%	—

As regards the value of various classes of German electrical exports, the first two places are again occupied by lighting and power equipment (switches, fuses, starters and controllers, cable fittings, wiring material, rectifiers, welding equipment, industrial furnaces, &c.), and by electrical machinery and transformers respectively. Exports of apparatus for wireless telegraphy and telephony amounted to practically the same in 1931 and in 1930, but changed places with cables and conductors in order of precedence, the latter being now fourth on the list.

For the rest, the order of precedence remains substantially unaltered; electric vacuum cleaners are not included in the groups mentioned. The first four groups—lighting and power equipment, machinery and transformers, wireless apparatus, cables and conductors—account for about 64.1 per cent. of the total electrical exports in 1931 compared with 62.7 per cent. in 1930.

Distribution of the Exports

The percentages of German electrical exports (by value) to various countries were approximately as follows, Holland leading in both years: 1931 (1930 *figures in brackets*) :—Holland, 10.4 per cent. (10.8 per cent.); Russia, 9.9 per cent. (5.6 per cent.); Great Britain, 8.9 per cent. (7.6 per cent.); France, 7.5 per cent. (8.0 per cent.); Sweden, 6.6 per cent. (5.2 per cent.); Italy, 4.7 per cent. (6.1 per cent.); Switzerland, Belgium, Czecho-Slovakia, Denmark, Austria, Spain and Norway, less than 5 per cent. each. The marked increase in Russian trade is important. On the other hand, exports to Poland fell from 14,900,000 marks in 1930 to 8,700,000 marks in 1931. Exports to other than European countries amounted to only 17 per cent. in 1931, compared with 20 per cent. in 1930, 23 per cent. in 1929, and 28 per cent. in 1913. With the exception of Argentina, which imported 22,600,000 marks' worth of German electrical goods in 1931 (compared with 27,800,000 marks in 1930), no other overseas country imports as much as 10,000,000 marks' worth. The fall in Brazilian and Chilean imports is described as "catastrophic." The trend of future export trade is not hopeful. To the well-known difficulties of tariff walls, import quotas and exchange restrictions, there are added heavy taxation and high social charges in Germany, and exchange rates which decrease the country's competing power in many markets.

Import Figures

The value of German electrical imports amounted to about 38.5 million marks in 1931, compared with 46.4 million marks in 1930, a decrease of 17 per cent. The principal imports (by value) were: Wireless apparatus, 29.4 per cent. (23.4 per cent.); machinery and transformers, 17.5 per cent. (19.9 per cent.); lighting and power accessories, 12.5 per cent. (15.0 per cent.); glow lamps, 11.9 per cent. (9.7 per cent.). Of the total electrical imports, about 20.8 per cent. (23.0 per cent.) by value came from Holland; 13.2 per cent. (16.7 per cent.) from the United States; 11.2 per cent. (10.0 per cent.) from Switzerland; 8.7 per cent. (7.2 per cent.) from Hungary; 7.5 per cent. (7.7 per cent.) from Austria; and 6.2 per cent. (6.3 per cent.) from Great Britain.

The excess value of German electrical exports compared with imports amounted to 492 million marks in 1931, compared with 584 million marks in 1930, a decrease of nearly 16 per cent. The total value of the raw materials imported by the German electrical industry amounts to about half the value of the exports, thus leaving, during recent years, several hundred million marks per annum on the credit side of the national trade balance. The continuance of this contribution depends on the extent to which international trading is further restricted by economic and political conditions.

Local Authorities' Contracts

THE I.M.E.A. has investigated the question of validity of contracts, exceeding £100 in value, entered into by local authorities for the execution of works or the delivery of goods, when tenders have not been invited by public advertisement as required under Section 174 (4) of the Public Health Act, 1875. Mr. J. W. Simpson, the secretary, has drawn up a memorandum on this and allied matters.

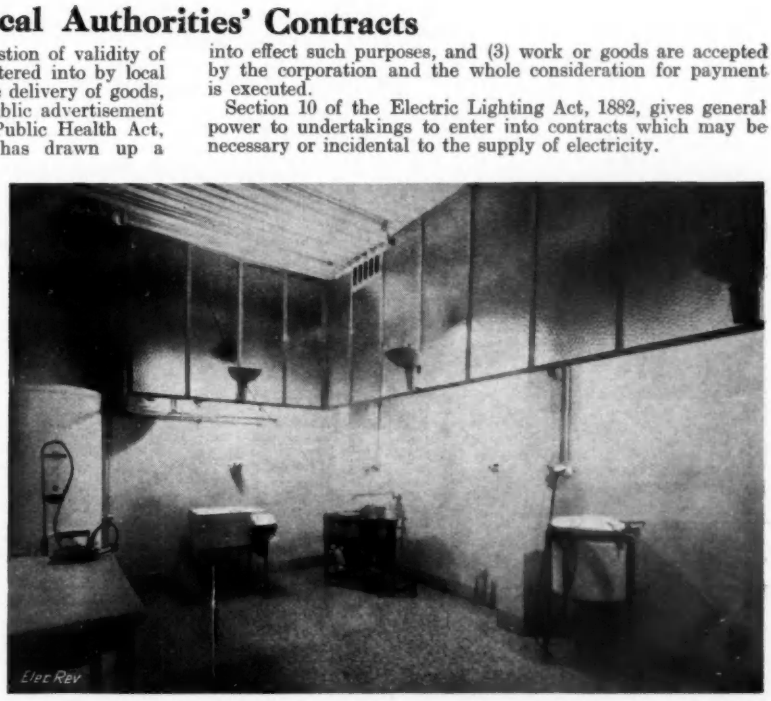
He says that this sub-section is directory only. It relates to "things to be done before contracts are entered into." The local authority will be liable for the breach of a contract, although the prescribed formalities have not been observed.

Section 174 (1) of the Public Health Act, 1875, requires every contract made by an urban authority under this Act, exceeding £50, to be under seal, but it does not apply to contracts entered into under the Electricity Acts.

Contracts by urban authorities, when not acting under the Public Health Act, are regulated by the ordinary law referring to corporate bodies, which is that a corporation (including a limited company and a company incorporated by charter) can only contract under seal.

There are exceptions to this rule, when its operation would occasion great inconvenience or tend to defeat the object for which the corporation was created, *e.g.* (a) trivial matters, (b) acts frequently occurring, and (c) where (1) the purposes for which a corporation is created render it necessary that the work should be done or goods supplied, (2) orders are given by the corporation for work or goods to carry into effect such purposes, and (3) work or goods are accepted by the corporation and the whole consideration for payment is executed.

Section 10 of the Electric Lighting Act, 1882, gives general power to undertakings to enter into contracts which may be necessary or incidental to the supply of electricity.



The demonstration electric laundry of the Cie. Parisienne de Distribution d'Electricité

How to Prepare an Inquiry. By Stanley Clarke

Tenderers are not always to blame for unsuitable offers

THE recent article dealing with the preparation of tenders prompted the writing of this article in the hope that it would reach the eyes of that section of the public who, from time to time, issue inquiries for electrical plant, more especially motors, in order that they may benefit themselves, and at the same time render considerably more assistance to the people to whom the inquiry is addressed.

The fault of many inquiries is, of course, the fact that they do not give sufficient details in the first instance for a tender to be submitted, unless it embodies several alternatives, entailing extra work, and even then it may not be possible for the intending purchaser to decide which of the alternatives is the correct one for the job in question.

As an extreme example, an inquiry was recently received asking for the price of a 5-h.p. s.c.r. motor; with the exception of the supply details no other information was given. It was only after writing two letters and making two telephone calls that it was found to be a short-time rated reversing slip-ring motor, with a suitable controller, that was required. This unnecessary additional expense and time could easily have been obviated if the person responsible for issuing the inquiry had used a little more imagination, and at the same time had satisfied himself that sufficient information was given.

In the case of large users it should not be left to some junior in the Buying Department to issue an inquiry for important plant, as an unsuitable motor may be offered in all good faith owing to lack of details, and, if installed, may possibly lead to considerable loss due to its failure at a critical period in a lengthy process. It is not sufficiently appreciated that the breakdown of a small motor costing only a few pounds, if it should happen to be on a key drive, may cause the shutting down of a whole section of plant, with consequent heavy losses. Therefore, every possible information should be given to the firm asked to tender, to ensure the supply of the correct motor for the drive in question. As there is such a multiplicity of specially developed machines to-day, it is only by stating all the facts regarding the type of drive concerned that the manufacturer is able to offer the one specially suited for the duty.

A great deal of this trouble can only be put down to carelessness, and it is surprising how much of this is allowed to go unchecked in these days when efficiency is imperative. In this category are placed those instances where supply details or the speed are omitted, and other such apparently trivial yet very important factors are not mentioned.

The Information Necessary

The ideal inquiry is the one which gives the necessary details under the following headings, and it might be of assistance to those issuing inquiries if they would keep them in mind.

Supply details, b.h.p. and speed.

Type of enclosure, or alternatively a description of the working conditions. Protected or screen protected is the standard and will be offered unless some indication is given that this type of enclosure will not be suitable; therefore, if the machine is to be installed out of doors or in a very dirty position it is essential to say so.

Rating, i.e., continuous, ½-hour, &c.

Type of motor, or information regarding how and what it is to drive—by belt, with a fast and loose pulley fitted or not; if the driven pulley is already existing give size and speed.

Type of cables that will be used.

If the motor is to drive a machine state the type, as different machines require a different type of motor—the motor for driving a lathe is quite unlike that required for, say, plate-bending rolls and the manufacturers' experience ensures the correct motor being offered for each application.

The Importance of the Correct Size

There must be an enormous proportion of the motors running at the present time seriously underloaded because in the past purchasers have often liked to "have a bit in hand," and, consequently, when the maker of the machine has stipulated, say, a 10-h.p. motor, the purchaser has installed a 12½- or 15-h.p. motor. In the case of d.c. machines, the only detrimental effect of this is to reduce the efficiency of the drive slightly, but if the supply is a.c., and the day will soon be here when it will be universal, quite another position arises. Not only is the motor less efficient when underloaded, but the power factor becomes very poor, and in those cases where bad power factor is penalised by the supply company it will mean a much heavier bill for power than would be the case if all the motors were fully loaded.

Going to the other extreme, we have the inquiries issued by most Government Departments, consulting engineers, etc., which are usually in the form of an exceedingly long and detailed specification, resulting in the estimator having to wade through page after page of useless jargon in order to extract the few essential details. Why in these enlightened days, when all reputable manufacturers of motors guarantee their machines to conform to British Standard Specifications, should it be necessary for special specifications to be drawn up for each inquiry, repeating in so many other words the various clauses of the Standard Specification concerned for such items as temperature rise, overload capacity, insulation tests, &c.?

It would save much time all round if it were simply stated that the equipment must comply with the appropriate Specification in all respects. As it is, these long specifications have all to be carefully checked over in case tucked away somewhere there may be some small deviation from the standard which affects the final offer, such as non-standard temperature rise or overload capacity. Then, too, a lot of the specifications of this type go farther and stipulate such things as "that all portions of the machine must be machined to fine limits for the sake of interchangeability"; yet these are the days of mass production.

In addition to the above, there are also those other nightmares of the estimator—the several appendices that have to be completed in most Government quotations, giving details that are almost certainly never referred to or made use of in any way at all, unless, of course, it is to keep the various pigeon holes well filled, and, at the same time, find work for Government officials! Most of these specifications referred to are as old as the industry, and whereas they may have been necessary years ago, it is surely meet that in these days of severe world competition and financial difficulty they should be done away with, thus helping industry by keeping down the cost of submitting a quotation.

Swiss Electrical Exports

WE reproduce below a statement relating to exports of electrical goods and apparatus during last year and in each case the increase or decrease as compared with 1930 is noted. At par £1 is approximately equal to 25 Swiss francs; the current quotation is in the neighbourhood of 18.

Swiss imports of this class showed a fairly substantial increase, but the United Kingdom's share was smaller. The principal items from this country were telegraph and telephone apparatus (670,000 fr. out of a total of 24,590,000 fr.), batteries and accumulators (134,000 fr. out of 1,606,000 fr.) and dynamo-electric machines and transformers (114,000 fr. out of 3,829,000 fr.).

	1931 Thous. Fr.	Inc. or Dec. Thous. Fr.
Dynamo-electric machines and electric transformers—		
Total	27,252	— 10,128
To Germany	3,586	+ 938
„ France	4,563	— 1,112
„ Italy	1,246	— 428
„ Belgium	1,370	— 1,340
„ United Kingdom	1,041	+ 394
„ Egypt	388	— 2
„ Spain	2,568	— 2,052
„ Poland	405	— 735
„ Rumania	720	— 1,512
„ Argentina	2,045	+ 685
„ Netherlands	901	— 1,489
„ Netherland Indies	293	— 832
„ China	452	— 83
„ Australia	265	— 208
„ Indo-China	457	+ 455
„ Canada	855	+ 455
„ Venezuela	368	— 68
Accumulators and batteries—		
Total	934	*
To France	334	—
„ Italy	137	—
„ Argentina	76	—
Insulators, mounted—		
Total	312	— 65
To Holland	67	+ 36
„ Spain	35	+ 1
„ Argentina	88	+ 82
Electric cable, not insulated—		
Total	1,365	— 770
To France	16	— 24
„ Austria	123	— 117
„ Italy	316	+ 94
„ United Kingdom	569	+ 12
„ Czecho-Slovakia	94	— 112
Cable, insulated, not lead covered or iron armoured—		
Total	582	— 335
Cable, lead covered—		
Total	60	— 31
To Denmark	18	*
„ Argentina	16	+ 13
Cable, lead covered and iron armoured—		
Total	99	+ 29
Cable, insulated with rubber or paper and covered with textiles—		
Total	249	— 391
To France	34	— 23
„ United Kingdom	152	— 192
„ India	34	+ 8
Cables, ditto, covered with lead—		
Total	112	+ 9
To United Kingdom	18	— 39
„ Yugoslavia	56	*
„ India	11	— 5
Electric locomotives—		
Total	630	— 2,000
To Italy	42	— 23
„ Denmark	132	*
„ Siam	423	*
Telegraph and telephone apparatus—		
Total	1,184	— 803
To France	185	— 51
„ Italy	255	— 51
„ Germany	157	+ 77
„ Holland	66	+ 48
„ Greece	176	— 244
„ United Kingdom	75	— 12
Incandescent lamps, mounted—		
Total	3,466	— 684
To Germany	1,054	+ 1,039
„ Holland	1,065	— 595
„ Denmark	237	— 213
Electric meters—		
Total	16,776	— 2,994
To France	3,072	+ 182
„ Belgium	1,800	— 440
„ United Kingdom	2,702	+ 142
„ Czecho-Slovakia	1,239	— 731
„ Holland	1,477	— 23
„ Japan	465	— 6
Electrical apparatus not elsewhere mentioned—		
Total	14,375	— 5,265

* Comparative figures not available.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Rural Activities

Cuddington is one of the prettiest villages in Buckinghamshire with its picturesque thatched-roofed cottages and its old-world quietude. It is the very last place where one would expect to find an electrical exhibition, but, nevertheless, there is one there. It was opened by Mrs. Bernard last Friday at the same time as she switched on the supply to the village. The exhibition is naturally a small one, and is being held in the school, but in spite of its small size it is remarkably comprehensive. There is almost every kind of domestic apparatus, including a washer and refrigerator, as well as radio, electro-medical and agricultural apparatus. The exhibition has been organised by Mr. W. A. Turnbull, the Aylesbury borough electrical engineer. Cuddington is one of the last villages to be electrified under this undertaking's development scheme, and receives its supply at 11,000 V, three-phase. The pole type sub-station comprises a single-phase 25-kVA transformer. The population of the village is 500 and the consumers at present number twenty-five. About 250 miles of line have already been erected outside Aylesbury, and the results as far as the domestic load is concerned, have so far been very encouraging. Unfortunately some difficulty is being experienced in persuading the farmers to use electricity extensively.

The exhibition at Cuddington village school

Annual Holidays

The works of Messrs. B. & F. Carter & Co., Ltd., Rochdale, will be closed from August 20th to 27th inclusive. A skeleton staff will be working to deal with urgent matters.

B.I.F. Site Committee Chairman

Lord Chelmsford has been appointed chairman of the British Industries Fair Site and Buildings Committee in succession to the late Sir Gilbert Garnsey. Lord Chelmsford was chairman of the committee which was set up in 1930 to examine the existing situation as regards the British Industries Fair, and to consider what means could be adopted to increase still further its utility to British trade, and it was as a result of a recommendation of his committee that the present investigation into the question of providing a permanent home for the Fair is being undertaken. It was with this fact in view that the Government invited Lord Chelmsford to serve as chairman of the British Industries Fair Site and Buildings Committee for the concluding stages of its work, and thus continue the work commenced by him in 1930.

The Timber Trade

Our Timber Trade Correspondent reports that conditions in the trade during the past month have been dull for European and Canadian building and joinery woods, building trade work for the time of the year being bad. Imports of sawn and planed wood have been on a larger scale compared with 1931, but with consumption slightly lower. Spot selling competition has been keen, whilst European shippers have been pressing this market for orders at prices well below Canadian quotations. The hardwood market, too, has remained dull. Some hundreds of mahogany logs have been cleared off brokers' hands as a result of the recent auction in London, which should add to the tone of that section of the wood market. Too much hardwood from the U.S.A. is coming forward at low rates that cannot give shippers much profit, and is largely putting Empire wood out of the running for firm orders. The high-class Indian woods as well as those from Australia, with the home-grown varieties, are affected by these large shipments from the United States. Generally, prices are as low as they are likely to be for some time.

E.D.A. Change of Address

From to-day (Friday) the address of the British Electrical Development Association, Inc., will be 2, Savoy Hill, London, W.C.2. The telegraphic address and telephone number will remain unchanged.

E. K. Cole Progress

We have received from Messrs. E. K. Cole, Ltd., an illustrated brochure giving particulars of the company's progress within the short span of seven years. This shows that in 1925 (its first year) the capital of the company was £50, its products were made in a small room of 50 sq. ft. and there were only five employés. So rapid has been the progress of the company, however, that its factory at South-end-on-Sea now covers a floor space of 175,000 sq. ft., and houses 2,000 employés, while the capital has been increased to £400,000. In our Personal Column to-day we reproduce the portraits of Mr. W. S. Verrells, chairman and managing director, and Mr. E. K. Cole, works and technical director.

Bingley Publicity

Mr. O. G. Cook, the chief engineer and manager of the Bingley Electricity Department, has sent us a copy of a new magazine which his Department proposes to publish quarterly. The primary aim of the magazine is to keep consumers in touch with the latest electrical developments and to direct their attention, in an attractive fashion, to the advantages of electrical apparatus and equipment.

I.F.S. Supply Board at Dublin Horse Show

At the Dublin Horse Show held last week, the Electricity Supply Board was well to the front with its exhibits of electrical appliances. All the new electrical devices that have come into use in domestic life in the Free State with the development of the Shannon Scheme were exhibited in a most attractive manner by the E.S.B., and included electric cookers, water heaters, refrigerators, toasters, and washing machines.

Swiss Electrical Exports

The exports of electrical machinery and apparatus from Switzerland during the six months ended June last attained a value of £606,920 (at par), as compared with £1,498,560 in the corresponding half of 1931.

Another Prize-winning Carnival Tableau

At the recent Chandlers Ford Carnival the West Hampshire Electricity Co., Ltd., was awarded a special prize for trade exhibits for its carnival lorry. On this was displayed domestic electrical appliances with a scenic background of Nelson's *Victory*, and the appropriate slogan "Electricity—The Silent Service." In conjunction with this tableau the company held a special carnival competition in which ten electric irons were presented for the closest estimate of the average price paid for electricity used for domestic purposes on the company's two-part tariff for the year 1931. The company's tableau is shown in the accompanying illustration.

"Electricity—the Silent Service"

Increased Import Duties

The Import Duties Advisory Committee announce that it has received and has under consideration applications for increased import duties on wagons and parts thereof, for light railways not exceeding 3 feet in gauge.

Church Lighting Installations

Although great advances have been made in church lighting, only in a comparatively few cases have new churches given the lighting engineer full scope for the employment of his artistry. An interesting contrast between a lighting scheme designed to deal with existing architectural features, and a scheme prepared by lighting engineers in collaboration with the architects of a new church is provided by two installations recently completed. One instance is that of Bradford Cathedral, in which " Mirolux " trough fittings produce excellent distribution from concealed positions. The other instance is that of the new Church of the English Martyrs at York (see p. 231). A distinctly modern note is struck in the manner of its design, which is essentially simple. Concealed lighting has been employed effectively as a medium of ornamentation and is used to illuminate the flat dome-shaped surface behind the altar which takes the place of the more usual rose window. The capitals of the pillars hold cornices containing strip lighting units. Both schemes are the work of the illuminating engineers of the Edison Swan Electric Co., Ltd., and Ediswan equipment is used throughout.

Trade Announcements

Mr. F. Davies, formerly with the Crewe & Suburban Electrical Services, Ltd., has commenced business as an electrical and radio engineer at 142, Flag Lane, Crewe.

The " Batwin " repulsion induction type a.c. motors and d.c. compound wound motors are now made in England by Power Contracts (Batwin), Ltd., 138, Southwark Street, S.E. These motors were previously imported from the United States.

Messrs. McLeod & McLeod, of 329, High Holborn, W.C.1, have sent us samples of " Everlock " washers which they are now manufacturing in this country and at a lower cost than they are produced in the U.S.A.

Catalogues Required

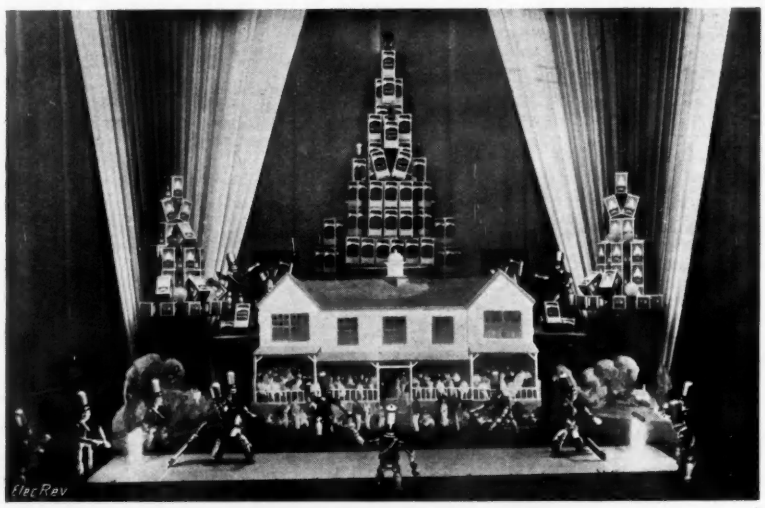
Messrs. L. Benn & Co., Ltd., Colonial Avenue, Minories, E.C.3, will be glad to receive price lists from manufacturers of British-made electrical accessories.

Messrs. Jacob, White and Co., having opened new engineering works, will be glad to receive engineering and Electrical catalogues at 235, Halfway Street Road, Sidcup, Kent.

Messrs. Herbert Terry & Sons, Ltd., Redditch, are reorganising their catalogue file and wish to receive copies of latest catalogues from English manufacturers of electrical goods. These should be addressed to their Purchasing Department.

An Ediswan Window Display

A novel window display was recently arranged by the Edison Swan Electric Co., Ltd., at its showrooms, Aldwych, W.C. This introduced the " Eddy Doll," the company's latest advertising creation. Two teams of " Eddies " took part in a realistic cricket match in which the wickets were composed of " Mazda " tubular lamps. The display was completed with



An Ediswan Mazda valve and lamp display

cartons for " Mazda " radio valves and lamps arranged in the background. The display is shown in the accompanying illustration.

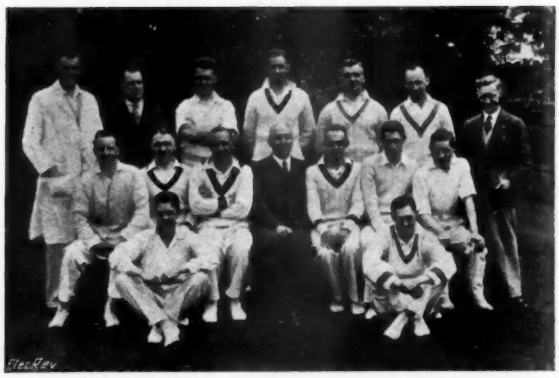
Electrical Production in America

The depressed state of the American electrical market may be visualised from statistics published in the *Survey* of the National Electrical Manufacturers' Association relating to the production of members during May. Compared with the corresponding month of 1931 orders for a.c. motors (1-200 h.p.) declined from $1,785,994 to $820,751, d.c. motors (1-200 h.p.) also falling from $440,476 to $203,503; fractional h.p. motors at $963,411 were $1,267,978 lower. Conditions in the power switching equipment section of the market were very bad, orders for outdoor apparatus having fallen from $73,567 to $17,876 and for outdoor apparatus from $208,713 to $52,388. The value of electrical furnaces on order was $25,019, as compared with $175,137. In general the number of members reporting to the Association was slightly higher.

Social Events

The Clesco Sports and Social Club of the County of London Electric Supply Co., Ltd., is holding its annual horticultural exhibition and garden party on September 3rd on the company's sports ground, Grand Drive, Raynes Park, S.W. The exhibition will open at 2 p.m., sports will be held during the afternoon, and in the evening there will be an alfresco concert and dancing. Music will be given by Messrs. Callender's Band.

The first of what is hoped will be a continuing series of inter-power company competitions and social meetings was held on July 30th, when teams of cricketers and bowlers from the Lancashire Electric Power Co. were the guests of the Yorkshire Electric Power Co. at the Wharfedale ground of the Otley Mills Club, kindly lent for the occasion by the directors of Messrs. Duncan, Barraclough & Co., Ltd. The Yorkshire company's cricket team defeated their opponents by twelve



The Yorkshire Electric Power Company's cricket team

runs, but the visitors turned the tables by winning the bowling match by 148 points. The teams and their friends were entertained to lunch and tea by the directors of the Yorkshire Co. The accompanying illustration shows the Yorkshire Power Co.'s cricket team with Mr. W. B. Woodhouse, engineer and manager, seated in the centre.

With the July round for the Marconiphone golf challenge trophy the monthly qualifying rounds have been completed. The final stages of the competition will be played on the West Herts Course at Watford on August 23rd.

The Mazda Light Infantry Contingent, recruited from the staff of the Mazda lamp works, took a prominent part in the recent Rugby hospital carnival. The sixty " Amazons " had been thoroughly trained and they marched in perfect time, preceded by a drum majoress. Their display included the changing of the guard.

Recent Contracts

Radiovisor Parent, Ltd., has received the order, through the Electroflo Meters Co., Ltd., to supply six of its industrial smoke indicators complete for the new Battersea power station of the London Power Co.

The contract for making the 30ft. diameter steel pipe for the four pressure tunnels at the Hoover Dam on the Colorado River has been placed with the Babcock & Wilcox Company (U.S.), their tender, $10,908,000, being the lowest. The *Electrical World* states that it will probably take five years to complete the pipe construction.

In under three months Messrs. J. F. Appelbe and Co., Hull, have supplied " Appelbe " bulb-fixers to over 40 municipalities and supply companies. The device enables lamps from 60 to 200 watts and E.S. fittings to be fixed and removed from heights up to 16 ft. without using a ladder. The fixer weighs under 3 lb. and can be supplied larger than the standard if required.

The British Thomson-Houston Co., Ltd., has received from the Admiralty a large order for Mazda vacuum and gasfilled lamps.

In our last issue we briefly recorded the placing of a contract by Brighton Corporation with Messrs. C. A. Parsons and Co., Ltd., for a 30,000-kW turbo-alternator and condensing plant. Messrs. Parsons inform us that the machine will be of the tandem type, working with steam of 650-lb. pressure and a temperature of 850 deg. F. at the stop valve, and arranged for feed heating to 340 deg. F. The plant will run at 3,000 r.p.m. and supply 3-phase current at 8,000 V, 50 cycles.

The D.P. Battery Co., Ltd., has received an order for three 300-V " Kathanode " submarine batteries for a foreign navy. The batteries will have a combined capacity exceeding 26,000 Ah. This order follows two previous ones for " Kathanode " batteries for the same navy.

Success of Employés' Sales Campaign

The phenomenal success of a recent Employés' Sales Campaign organised by the Westinghouse Electric International Co., U.S.A., during which sales to the number of 35,607 and valued at $1,503,268, were made, may encourage manufacturers on this side of "the pond" to make similar efforts. During May each of the company's 35,000 employés—office boys, stenographers, draughtsmen, clerks, engineers and executives—was asked to interest his friends and acquaintances in appliances and devices of Westinghouse manufacture; as soon as a "prospect" evinced any interest in a product, his name was handed over to the nearest Westinghouse dealer so that the latter could assist in following up and completing the sale. The campaign was made all the more interesting and effective by the introduction of a spirit of rivalry between various divisions or "teams" of the company, each team being bent on selling the greatest volume of products.

Pit Head Baths

We learn that the whole of the installation at the new Pit Head Baths at the North Celynen Colliery (ELEC. REV., August 5th, page 195), is controlled and protected by an "S.E.S." switch and distribution panel, which was specially designed and built by Messrs. Simplex Conduits, Ltd., to the order of Messrs. A. G. Arnold & Sons.

For Sale

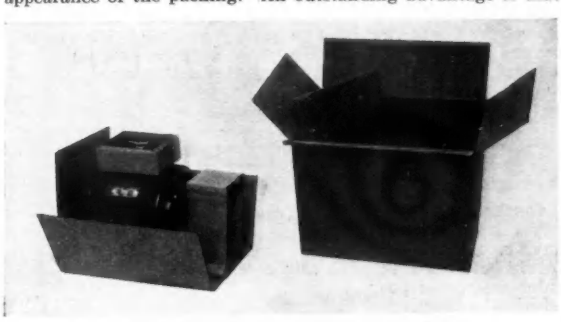
Ashford Electricity Department has for disposal suction gas plant with engine, battery, switchboard, &c.

Messrs. W. T. Henley's Telegraph Works Co., Ltd., Gravesend, have for sale a rotary-convertor, with starter, control panels, etc.

(See our advertisement pages to-day.)

Carton Packing for Motors

The use of cartons for the packing of electric motors is a recent innovation in Paris, and in the place of the old style wooden box or crate, a special box of fibre board has been designed. The interior of the carton has also been specially constructed, and the accompanying illustration shows the neat appearance of the packing. An outstanding advantage is that



How a ½-hp. motor is packed in a carton

it is possible to print on the smooth surface of the cardboard in an attractive manner, this being neater than the stencil on rough wood. Before these boxes were used they were put through a very severe test in a revolving drum, receiving treatment many times rougher than the handlings of ordinary transportation. It was found that the contents were amply protected and that the durability of the cardboard was most satisfactory.

Prices of Materials

Messrs. F. Smith & Co. report, August 10th: Electrolytic copper bars, sheets and wire rods, no change. Electrolytic copper h.c. wire, 6¼d., 7/16d. inc. Silicium bronze wire, 8¾d., 5/16d. inc.

Messrs. Edward Till and Co. report, August 10th: India-rubber, Para fine, 4¼d., ¼d. inc.

Messrs. James and Shakespeare report, August 10th: Copper bars (best selected), sheet and rod, £59, £2 inc.; English pig lead, £12 15s., 10s. inc.

"Model Engineer" Exhibition

The various sections of the *Model Engineer* Exhibition to be held at the Royal Horticultural Hall, Westminster, from September 1st to 10th, will be fully representative of the finest work achieved in the country. The trade section will include all the latest developments in tool model and electrical and scientific apparatus.

Advertisement Correction

Messrs. Gent & Co., Ltd., ask us to state that the prices of their "Electro-Matic" clocks were incorrectly given in their advertisement in our last issue (p. ix). They should have been £2 18s. and £2 16s. respectively.

Lighting Units

Radiovisor Parent, Ltd., will be exhibiting its Radiovisor lighting units at the exhibition at the Conference of Public Lighting Engineers which is being held at Blackpool from September 5th.

Virgin Island Customs Tariff

According to the *Board of Trade Journal*, an ordnance has been issued under which certain amendments to the Customs Duties Ordnance, 1927, relating to imports into the Virgin Islands have been made, with effect from May 24th. Included in the list of goods which are affected is electrical apparatus, the general duty on which has been increased from 12 to 15 per cent. *ad val.* The preferential duty, however, remains at 8 per cent. *ad val.*

The Swedish Ericsson Company

Reuter's New York correspondent reports as follows: "Negotiations abroad indicate that the International Telephone and Telegraph Co. is about to acquire a substantial interest in the Ericsson Telephone Co. of Sweden," states the *Herald-Tribune*. If these negotiations are completed, says that paper, the Ericsson Co. would be practically placed under the control of the International Telephone Corporation.

New Catalogues and Lists

Hume, Atkins & Co., Ltd., Pixmore Avenue, Letchworth, Herts.—Illustrated catalogues of electric lighting fittings, including the "P.I.X." low-voltage linear fittings.

British Electric Lamps, Ltd., Wimbledon, S.W.19.—A catalogue, illustrated in colour, of the complete range of "B.E.L.L." electric lamps.

Unalite, Ltd., 57, Theobald's Road, Southampton Row, W.C.1.—A folder containing particulars of reduced prices of "Unalite" shop-window and floodlight reflectors and fittings, &c.

Walker Electrical Service, Annandale Street, Edinburgh.—A card depicting various stages in the rewinding of a rotor by the company's breakdown service.

Smith's Electric Clocks, Ltd., 179-185, Great Portland Street, W.1.—A folder showing representative examples of the company's extensive range of electric clocks.

Ateliers de Constructions Electriques de Charleroi, 56, Victoria Street, S.W.1.—An August stock list of electric motors, generators, transformers, &c.

Wm. Sanders & Co., Wednesbury, Staffs.—A leaflet on cooker control switches.

A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—Pamphlet No. 440, describing the company's alternator field-breaking devices.

British Thomson-Houston Co., Ltd., Rugby.—A circular relating to the "Mazda Lund" anti-dazzle headlight.

Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.1.—A leaflet and window-bill dealing with the recently introduced "Model 248" two-valve battery receiver, together with a cut-out price ticket.

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.—Leaflet No. 302/1-1, describing high-voltage bushing insulators.

George Ellison, Ltd., Perry Barr, Birmingham.—Booklet No. 201 on the installation and maintenance of the "Ellison Bantam" circuit breaker, direct-on starter and star-delta starter.

Hailwood and Ackroyd, Ltd., Morley, near Leeds.—A leaflet giving particulars of shades and bowls made of "Hailflake."

Marconi's Wireless Telegraph Co., Ltd., Marconi House, Strand, W.C.2.—Illustrated technical descriptive pamphlets on short-wave radio, telephone-telegraph receivers and accessories for commercial and ship-shore services (Nos. 1,141-2-4), and marine "call" apparatus (No. 1,145).

Bankruptcy Proceedings

G. E. Palmer, wireless and electrical dealer, 1, Two Mile Hill, St. George, Bristol.—The first meeting of creditors was held recently at the Official Receiver's Office, 26, Baldwin Street, Bristol, when the statement of affairs showed liabilities of £942, and a deficiency of £653. The position was attributed to lack of capital, business inexperience, inability to give adequate attention to the collection of outstanding accounts, and bad seasons due to abnormal trade depression in the district. The case was left in the hands of the Official Receiver as trustee.

J. Hiller, electrical and radio engineer, 76, Whitechapel Road, E.1, late of 52, Whitechapel Road, E.1.—The statutory first meeting of creditors was held at Bankruptcy Buildings, W.C., on August 3rd. The debtor filed his own petition on July 18th, and his statement of affairs showed liabilities £778 and no assets. The estate was left in the hands of the Official Receiver.

C. E. Pittman, electrical contractor and wireless dealer, 49, Birchanger Road, South Norwood, S.E.25, and 12, Station Road, West Croydon, Surrey.—The first meeting of creditors was held on August 4th, at 29, Russell Square, W.C., when the statement of affairs showed liabilities of £831 and assets of £158, leaving a deficiency of £673. The position was attributed to profits from the business being insufficient to meet heavy overhead charges and to bad debts. The case being a summary one was left in the hands of the Official Receiver as trustee.

G. A. Laird & D. Hyde (Burbury, Laird & Co.), electrical engineers, 6, Warwick Row, Coventry.—Receiving order made July 29th on debtors' own petition.

E. L. Pratt, electrical engineer, 5, Nowell Mount, Harehills, Leeds.—First and final dividend of 1½d. in the £, payable August 10th at Standard Buildings, City Square, Leeds.

P. W. Ottoway (Victor Radio Supplies), wireless dealer, 73, Victor Street, Great Grimsby.—Trustee, Mr. J. F. Wintringham, St. Mary's Chambers, Great Grimsby, Official Receiver, released July 14th.

F. V. Howitt (Falkesley Co.), electrical engineer, Riste's Place, Barker Gate, Nottingham.—Trustee, Mr. L. A. West, 22, Regent Street, Park Row, Nottingham, Official Receiver, released July 18th.

C. G. Smith, electrical contractor, 66, Lichfield Street, Wolverhampton. First dividend of 2s. 6d. in the £, payable August 17th, at Gresham Chambers, 14, Lichfield Street, Wolverhampton.

W. P. Barnell, electrical engineer, 25A, Sheep Street, Northampton.—Trustee, Mr. T. Bengough, 6, The Parade, Northampton, Official Receiver, released July 18th.

G. H. Hansen, electrical engineer, 50, Park Road, Peterborough.—Trustee, Mr. J. L. Wilkinson, 41, Sidney Street, Cambridge, Official Receiver, released July 12th.

C. W. Whitle, electrical sales engineer, 45, Fife Road, Darlington.—Trustee, Mr. C. L. Townsend, 80, High Street, Stockton-on-Tees, Official Receiver, released July 18th.

A. Roberts, described in the receiving order as A. de Villiers (Castle Radio Manufacturing Co.), wireless and electrical manufacturer and dealer.—Last day for receiving proofs for dividend, August 31st. Trustee, Mr. F. T. Smith, 150, Southampton Row, W.C.

Company Liquidations

Priestman Power Co., Ltd.—Winding up voluntarily. Liquidator, Mr. N. Merz, Carliol House, Newcastle-upon-Tyne.

Community Radio, Ltd.—Meeting, September 2nd, at 11, Chancery Lane, W.C., to receive an account of the winding-up by the liquidator, Mr. E. M. Haslam.

J. W. Sadler & Co., Ltd.—Meetings, September 5th, at 10, Harrison Road, Halifax, to receive an account of the winding-up by the liquidator, Mr. K. W. Howarth.

Fogdens Electric Co., Ltd.—Meeting, September 15th, at Danes Inn House, 265, Strand, W.C., to receive an account of the winding-up by the liquidator, Mr. C. F. Farmery.

Western Anglo-Swedish Electric Welding Co., Ltd.—Meeting, September 29th, at Billiter House, Billiter Street, E.C., to receive an account of the winding-up by the liquidator, Mr. F. H. Bell.

Dissolution of Partnership

Lincoln & Egerton, electrical contractors and radio engineers, 48, Market Place, Great Yarmouth.—Messrs. T. F. W. Lincoln, J. F. Egerton and F. B. Beach have dissolved partnership. Messrs. Lincoln and Egerton will attend to debts and carry on the business.

Private Arrangements

R. Braham (trading as B. Braham), condenser and radio manufacturer, 1, Mallow Street, London, E.C.—At the meeting of creditors a statement of affairs was submitted, which showed liabilities of £2,184 and, after allowing £100 for preferential claims, net assets of £266, or a deficiency of £1,918. It was stated that the business had been affected through the rate of exchange, as certain supplies had been obtained from Switzerland. A deed of assignment had already been executed, and if that deed was approved the cash creditors would withdraw their claims. The stock consisted largely of raw materials for the making of condensers. An offer was submitted of 7s. 6d. in the £, payable by three equal instalments in November, 1932, and February and May, 1933. In answer to a question the debtor stated that he hoped to receive some very large orders during the next few weeks, and if the stock was made up considerably better prices would be obtained than if the material was sold in its present state. After a short discussion a resolution was passed confirming the deed and a committee of the principal creditors was also appointed.

British Pix Co., Ltd., 118, Southwark Street, S.E.1.—A meeting of creditors was held recently, at Winchester House, E.C., for the purpose of considering a Scheme of Arrangement for the settlement of the company's liabilities. Under the Scheme it was proposed that the unsecured creditors of the company should accept payment of their claims in full by the following instalments: "Ten ninetieths of debts on October 1st, 1932; ten ninetieths on November 17th, 1932; thirteen ninetieths on December 1st, 1932; thirteen ninetieths on January 1st, 1933; thirteen ninetieths on February 1st, 1933; thirteen ninetieths on March 1st, 1933, and the remaining eighteen ninetieths on April 1st, 1933. It was also proposed that the company should pay interest on the amounts outstanding to the creditors at the rate of 5 per cent. per annum and that security should be provided in the shape of a debenture for £9,000, issued on July 5th last to Mr. A. G. White, Cheapside, E.C., as trustee. According to figures presented to the creditors in June, assets totalled £13,281 and liabilities to the trade £8,285, and there was a surplus of £4,282. The chair was occupied by one of the principal creditors, who reported that a large number of proxies had been judged in favour of the Scheme. On a vote being taken a unanimous resolution was passed expressing approval of the Scheme.

D. G. Page (trading as D. G. Page Electrical Equipments), electrical goods manufacturer, 1, King Alfred Place, Birmingham.—A meeting of creditors was held recently, at the offices of Messrs. Poppleton & Appleby, Corporation Street, Birmingham, when the statement of affairs submitted showed liabilities of £524, of which £432 was due to the trade. The assets totalled £763, and after allowing £25 for preferential claims, the net assets were £738, or a surplus of £213. The present position was attributed to lack of capital and bad trade. It was stated that the debtor's principal trade consisted of supplying electrical opening devices for windows and doors, but as that trade had fallen off considerably he took up an agency for supplying electric lamps in respect of which he lost money. After discussing the position the creditors resolved that the debtor should execute a deed of composition in favour of Mr. F. E. Bendall, of Messrs. Poppleton & Appleby, and that he should pay to the trustee the sum of £20 per month, the first instalment being paid on the 1st September, 1932, until 20s. in the £ had been paid. It was also decided that a loan creditor and the debtor's wife should withdraw their claims.

F. Widdop, wireless dealer, etc., 21, Queen's Arcade, and 4, The Grange, Wortley, both Leeds.—A meeting of creditors was held recently when a statement of affairs, prepared by Mr. E. S. Booth, 63, Albion Street, Leeds, was submitted, which showed liabilities of £813, of which £802 was due to unsecured creditors and £11 was in respect of a partly-secured creditor. The assets totalled £610, and after allowing £109 for preferential claims, the net assets were £50, or a deficiency of £312. The present position was attributed to insufficient working capital; too rapid repayment of the purchase money; decline in turnover and general trade depression. It was resolved that the debtor should execute a deed of assignment in favour of Mr. E. S. Booth, as trustee, with a committee of inspection.

Electricity Supply

Lighting, Domestic, Power

Bewdley (Worcester).—SUPPLY PROSPECTS.—In reply to an inquiry by the Town Council as to when a supply of electricity will be available for the higher parts of the town, the Shropshire, Worcestershire and Staffordshire Electric Power Co. has replied that a scheme for supplying the area named is under consideration, but owing to the large programme to which the company is committed in the next few months there is little chance of the work being carried out for some time.

Birmingham.—CHEAPER ELECTRICITY.—The following reductions, to take effect from the September meter readings, have been authorised by the Electricity Supply Department:—Lighting flat rate: A reduction of ½d. per kWh. Advertising and shop-window lighting: A reduction of ½d. per kWh. Power, heating and cooking flat rates in rural areas: A reduction of ½d. per kWh. In the city of Birmingham all l.p. supplies consumed in excess of 5,000 kWh per quarter will be charged at the rate of 1½d. per kWh instead of 1¼d. In the case of e.h.p. supplies, the addition of the basic rate, due to the interest and wages clauses in consumers' agreements, will cease to operate after the September accounts; this represents a reduction of approximately 10 per cent.

Burnham (Bucks).—PUBLIC LIGHTING.—The Parish Council has received sanction to a loan of £500 for converting public lighting from gas to electricity, and for extending the lighting area.

Canterbury.—SPECIAL ORDER.—The Corporation has applied to the Electricity Commissioners for a Special Order authorising it to extend its supply area so as to include the parishes of St. Dunstan Without and St. Nicholas Hospital, and parts of the parishes of Hackington, St. Cosmus and St. Damian in the Blean, Faversham, Harbledown, Thannington Without and Nackington.

Colchester.—EXTENSIONS.—At a recent meeting of the Electricity Committee, the electrical engineer submitted particulars and an estimate of cost of completing the Western Ring Main from Great Horkesley to Ford Street, *via* Little Horkesley and Wormingford, including spur lines to Fordham, Chappel and Wakes Colne, and also the estimated cost (£930) of continuing the line as far as little Horkesley only. The Committee decided to continue the line to Little Horkesley.

SUPPLY TO GRAVEL PITS.—The Electricity Committee is considering a report by the consulting engineer on the construction of an e.h.p. line to supply electricity to Messrs. B. B. and M. Barrell's gravel pits.

Continental.—BELGIUM.—The old concession for the electricity supply in Antwerp having expired, new arrangements have recently been completed under which the work will in future be carried on by a new concern known as the Société Intercommunale pour la Distribution Electrique d'Anvers, in which the municipal authorities of Antwerp and the commune of Lille, as well as the Compagnie Electrique Anversoise and the Société de l'Electricité de l'Escaut, are financially interested. The new agreement will run until 1962.

Dartford.—WATER-HEATING CHARGES.—The Electricity Committee recommends that the charge for electricity for water heaters, when thermostatically controlled, should be fixed at ¾d. per kWh.

Eastbourne.—CHARGES IN RURAL AREAS.—The Electricity Committee has decided to adopt the following reductions in charges in the rural areas: All-in tariff: Domestic rate, fixed charge to be reduced to 15 per cent. of rateable value; and the "unit" charge of ¾d.; business rate, a reduction in fixed charge, the "unit" charge remaining at 1d. Lighting flat rate: To 6d. per kWh. Heating, cooking and power: Summer rate, 1d. per kWh; winter rate, 1¼d.

ASSISTED WIRING.—At a recent meeting of the Electricity Committee, the electrical engineer reported that a letter had been received from the Electrical Contractors' Association in connection with the Polegate assisted wiring scheme. It was suggested that the whole of the rural area should be included in the Hailsham contract and that the present contract for 50 houses should be extended at the same figure of 21s. 6d. per point. The Committee agreed and also decided to reduce the rate to be charged to assisted wiring consumers from 10d. to 9d. per kWh.

EXTENSIONS.—The Electricity Committee is applying for sanction to loans of £25,000 for mains extensions, and £11,760 for extensions to the Winkney Estate and Hampden Park.

Folkestone.—COUNCIL NOT TO PURCHASE UNDERTAKING.—The Electricity Commissioners have refused their consent to the application of the Town Council to purchase the borough portion of the undertaking of the Folkestone Electric Supply Co., Ltd., on the ground that it would be an undesirable and retrograde step to break up the present area of supply of the company. The company has, however, offered certain concessions, and on the ratification of an agreement, charges will be reduced as follows:—Lighting flat rate: From 6d. to 5½d. per kWh. Power: First 2,000 kWh per quarter, 2½d.; next 3,000 kWh, 2d.; next 5,000 kWh, 1¾d.; beyond, 1½d. The "unit"

charge under the domestic two-part tariff is to be reduced from 1d. to ¾d., and there is to be a similar reduction in the business two-part tariff. The tenure of the company is to be renewed for a period of 25 years, and the Corporation is to have the right to call upon the company to reconsider current rates every five years, and to nominate two members to the board of directors.

Glasgow.—STANDBY PLANT.—The Health Committee has requested the medical officer of health to report on a proposal to provide emergency standby plant at various institutions.

PROGRESS DURING JUNE.—Under the Electricity Department's scheme 118 houses were wired in June, making a total of 35,898. The number of hired appliances now installed is 19,614.

MAINS EXTENSIONS.—It is proposed to lay distributing mains in Buchanan Street and St. George's Place (for distribution and change-over purposes) at a cost of £689.

COOKER CHARGES.—The Electricity Committee has decided to fix the annual rental hire charge for the new type of electric cooker at 30s., the charge for the old type remaining at 20s. The necessary wiring required for any electrical apparatus hired from the Department is to be installed by the hirer, free of charge to the Corporation.

Golcar (Yorks).—EXTENSIONS TO BOLSTER MOOR.—The Urban District Council has applied to the Huddersfield Corporation for the extension of its electricity service to Bolster Moor.

Elland (Yorks).—A SUPPLY FOR LOWER EDGE.—The Urban District Council has decided to give a supply of electricity to Lower Edge.

Halifax.—THE CHANGE-OVER.—The Town Council has received sanction to a loan of £10,000 for work in connection with the change-over.

Harwich.—SPECIAL ORDER.—The Corporation has applied to the Electricity Commissioners for a Special Order authorising it to extend its area of supply so as to include a portion of the parish of Ramsey.

Hastings.—EXTENSIONS.—The Town Council has decided to extend mains in Marley Lane, Battle, at a cost of £335, and on the Tile Kiln Farm Estate, at a cost of £1,545. A supply is also to be given to the Brede water pumping station at a cost of £1,974, for which sum a loan is to be applied for.

Heston and Isleworth.—LOAN.—The Urban District Council is to apply for sanction to a loan of £40,000 for electrical apparatus and rental wiring.

Kent.—HOSPITAL INSTALLATIONS.—The Public Assistance Committee is to provide an electric lift at Avenue Hospital, Dartford, at a cost of £900, and install electricity at Pembury Hospital wards at a cost of £200.

Leicester.—MAINS EXTENSIONS.—The Electricity Committee is to apply for sanction to a loan of £50,000 for additional mains.

Medomsley (County Durham).—REDUCED CHARGES.—The Parish Council has received a letter from the Consett Iron Co. intimating its decision to reduce the charge for electricity from 7d. to 6d. per kWh and to introduce a new tariff under which, for four-roomed houses, the charge would be further reduced to 3d. per kWh for all energy consumed over 96 kWh per annum. Meter rent is also to be lowered.

New Zealand.—FURTHER TROUBLE AT ARAPUNI.—Another heavy leakage has developed at the Arapuni hydro-electric station where remedial measures costing £500,000 have recently been completed. The new leakage has, however, been located and it is expected that repairs can be effected without closing the plant.

Ombersley (Worcester).—A SUPPLY SOON.—The managing director of the Shropshire, Worcestershire and Staffs Electric Power Co. has informed the Parish Council that the company expects to have a supply of electricity available for the parish before the end of October.

Scilly Isles.—ELECTRIFICATION SCHEME.—It is reported that plans are in hand for the supply of electricity to the houses and farms throughout the islands.

Siberia.—HYDRO-ELECTRIC DEVELOPMENTS.—The industrialisation of the East Siberian region is dependent to a large extent upon the exploitation of its hydro-electric resources and the tremendous coal and other natural resources available. The harnessing of the Angara River and its tributaries will be the basis of this development, and Prof. A. Alexandrov, who worked out the plans for the Dnieprostroy power station in Soviet Russia, is in charge of the scheme. Plans are also

Illumination of a modern church **(see page 228)**

being made for a large power plant on the Yenisey River, about twenty-five miles from the mouth of the Angara, while other installations will be at Artomonov and near Krasnoyarsk. The first unit of the Angara system, the Pribaikal project, will use the water stored by two dams on the Angara River and one on the Irkut River. Since its construction will necessitate an immediate supply of power, a steam power plant is to be built. This station is scheduled to be completed by 1934, the Irkut River dam in 1937 and the Barkhatovo and Baikal dams on the Angara in 1938 and 1941 respectively.

South Mimms.—COUNCIL HOUSE INSTALLATIONS.—The North Metropolitan Electric Power Supply Co. has offered to install electric lighting in Council houses at a cost of approximately 7d. per week for ten years, the installation to become the property of the Rural District Council at the end of that period. The Council, in reply to a request for a guarantee that future tenants should pay 7d. per week, has stated that there is no objection to the tenants making agreements with the company, but that the Council cannot give the required guarantee.

Stockton-on-Tees.—SUPPLY TO STEEL WORKS.—The Electricity Committee is in negotiation with the South Durham Steel and Iron Co., Ltd., regarding a supply of electricity to its works.

Municipal Supply Undertakings Results in 1931-32

Town.	Engineer.	Total Revenue. 1930-31.	Total Revenue. 1931-32.	Working Expenditure. 1930-31.	Working Expenditure. 1931-32.	Net Profit or Loss. 1930-31.	Net Profit or Loss. 1931-32.	Sale of Electricity. 1930-31.	Sale of Electricity. 1931-32.
		£	£	£	£	£	£	kWh.	kWh.
Barking	W. E. Kidner	—	64,655	—	42,143	+ 5,332	+ 10,227	6,333,174	7,157,715
Bath	J. W. Spark	117,590	122,626	58,906	61,788	+ 10,480	+ 6,814	23,709,530	27,276,300
Bedford	R. W. L. Phillips	—	159,485	75,015	88,820	—	+ 5,114	36,377,306	45,585,930
Brighton	W. N. C. Clinch	319,116	360,112	160,736	172,682	+ 38,670	+ 47,271	54,853,814	71,940,694
Bristol	A. F. Proctor	665,901	688,280	336,939	317,345	+ 19,550	+ 20,113	103,036,853	111,341,039
Cardiff	C. G. Morley	289,258	288,539	135,643	127,479	+ 39,168	+ 42,858	44,176,380	47,052,029
Croydon	F. N. Rendell-Baker	343,266	388,811	150,276	157,958	+ 39,138	+ 57,900	65,478,580	82,467,381
Darwen	F. M. Fletcher	33,207	34,046	20,456	20,805	+ 3,264	+ 3,941	—	—
Derby	F. Nicholls	230,000	237,000	108,000	107,000	+ 22,000	+ 23,000	—	—
Douglas	B. Kelly	—	41,458	—	20,290	+ 733	− 269	—	2,324,062
Eastbourne	J. K. Brydges	137,882	164,261	90,834	119,259	+ 944	+ 4,735	19,756,297	22,016,489
East Ham	W. R. Elliott	137,053	136,318	86,393	81,419	+ 1,651	+ 5,281	15,220,587	16,6-6,608
Exeter	A. L. Keet	95,829	110,506	—	49,282	+ 7,912	+ 5,686	8,657,129	11,582,872
Great Yarmouth	P. E. Rycroft	121,233	123,376	46,879	46,243	+ 10,123	+ 8,103	14,238,941	15,122,347
Hastings	A. J. Ryan	134,796	156,127	70,779	91,662	+ 12,283	+ 16,683	19,367,965	22,387,790
Hull	J. N. Waite	478,420	493,665	—	—	+ 53,012	+ 42,460	113,575,117	101,674,713
Kettering	W. H. Walker	95,157	89,428	49,403	51,546	+ 41,988	+ 46,359	10,245,278	11,307,321
Lincoln	S. Clegg	99,764	155,406	54,861	103,389	+ 7,589	+ 13,112	17,978,822	18,519,959
Liverpool	P. J. Robinson	1,412,725	1,446,212	751,518	757,323	+124,943	+ 94,485	279,730,726	297,024,887
Nottingham	G. H. Lake	—	490,054	—	198,934	+ 40,770	+ 54,620	57,737,645	66,268,510
Portsmouth	B. Handley	304,516	318,660	170,437	186,280	+ 19,783	+ 16,099	39,863,337	44,522,969
Rawtenstall	C. L. E. Stewart	66,693	67,856	43,731	41,811	+ 599	+ 3,775	13,784,746	14,344,320
St. Pancras	J. T. Baron	309,677	318,561	116,006	123,821	+ 24,325	+ 20,960	50,343,718	56,565,325
Salford	L. Romero	323,113	326,187	156,842	151,806	+ 35,202	+ 40,121	65,924,996	69,338,785
Sheffield	E. Morgan	849,735	882,937	479,383	449,361	+ 54,500	+102,230	206,180,503	207,861,395
Shoreditch	W. Weekes	188,184	187,025	83,156	87,831	+ 17,830	+ 2,363	23,001,386	24,506,049
Stoke-on-Trent	C. H. Yeaman	217,113	226,546	163,592	162,571	+ 297	+ 3,519	38,772,850	41,822,711
Taunton	A. J. Howard	—	36,971	—	22,056	—	+ 4,953	—	—
West Ham	J. Townley	419,280	439,546	241,562	251,265	+ 23,593	+ 22,417	99,165,353	112,601,471
Willesden	A. W. Blake	224,126	249,357	163,079	179,528	+ 438	+ 9,131	—	—
Wolverhampton	T. A. G. Margery	311,695	330,773	207,315	211,504	+ 65,758	+ 70,861	77,264,752	85,314,227

Traction

Continental.—BELGIUM.—The work of electrifying several additional sections of the local railway system of the Société Nationale des Chemins de Fer Vicinaux has lately been completed, electric trains now being in operation between Mouscron and Menin, a distance of seven miles, between Mouscron, Christ and Montaleux, between Pasbrug and Heyst-op-den-Berg, between Mons and Havre, and between Adinkerke and La Panne.

GERMANY.—The second electric trolley-bus service in Germany has recently been put in operation between Idar and Tiefenstein, near Oberstein an der Nahe, a distance of about 2¾ miles, twenty-two journeys per day being made each way by two six-wheel single-deck vehicles, constructed by the Waggonfabrik Gesellschaft of Uerdingen-am-Rhein. A feature of the vehicles is the unusual type of chassis employed, the mechanical and electrical parts of the equipment being supported on the steel bodywork. Each pair of the rear side wheels is driven by a separate electric motor, thus obviating the use of differential gear. The electric equipment of the vehicles, as well as the provision of the overhead electric conductors, was carried out by the A.E.G., of Berlin. The buses have an overall length of 29 ft. 9 in. and a width of 7 ft. 8 in.

SWEDEN.—On large sections of the Stockholm-Malmoe railway line, with its junction lines, the work of electrification has now been quite, or nearly, completed. A few days ago electric locomotives began to run on the Stockholm-Norrköping section, and within the next year the whole electrification programme established by the Riksdag will be carried out. Probably the State Railway Board will ask the Government to propose to the next Riksdag an electrification of the northern main line between Stockholm and Aange, a distance of 484 km. If this plan is accepted by the Government and the Riksdag, work will probably begin next summer.—*Reuters Trade Service*, Stockholm.

Glasgow.—TRAFFIC SIGNALS.—The Streets Committee is to erect an experimental set of "Electromatic" vehicle-operated traffic signals at a cost of £350 at the junction of Buchanan Street and Sauchiehall Street.

Irish Free State.—THE DRUMM TRAIN.—The No. 2 Drumm train made a successful double journey from Inchicore to Portarlington and back on August 4th. The first Drumm train has now been in service for six months.

Northampton.—TRACK RENEWAL.—The Tramways Committee is to repair the tram track near All Saints' Church at a cost of £1,200.

Nottingham.—TROLLEY-BUSES TO REPLACE TRAMS.—The County Council reports that the Nottinghamshire and Derbyshire Traction Co. is proposing shortly to substitute trolley-buses for the tramways between Cinderhill and Kimberley.

Rotherham.—TROLLEY-BUS IMPROVEMENTS.—The transport manager has been authorised to have a trolley-bus fitted with a new type of motor, stated to be more economical, at a cost of £136, for experimental purposes.

Southend-on-Sea.—NEW SERVICE.—A new trolley-bus route between Victoria Circus and Hamstel Road was inaugurated by the Town Council on August 7th.

South Shields.—TRAMWAY ECONOMIES.—In view of declining revenue from their municipal transport undertaking, the Town Council has empowered the Tramways Committee to curtail services, reduce working time of employés, and effect other economies deemed desirable.

Communications

Brazil.—TELEPHONE PROGRESS.—From the recently issued report of the Brazilian Traction, Light & Power Co., Ltd., we learn that, owing to the generally depressed business conditions, the extensions carried out during 1931 by its subsidiary concern, the Brazilian Telephone Co., were seriously curtailed. In spite of these conditions, however, there was a small increase of 380 telephones in service at the end of the year as compared with 1930, and the increase would have been greater but for the reduction in the number of telephones for Governmental services as a result of an economy plan. In Rio de Janeiro, the installation of 10,000 line automatic equipment in the Central Exchange was completed. In the City of Sao Paulo an 800-line unit was installed to operate as a satellite, and automatic service in Bello Horizonte, the capital of the State of Minas Geraes, was completed during the year. The installed capacity is 3,000 lines. Automatic service in the City of Campos was also completed during the year, a 1,300-line unit having been installed. The number of automatic telephones in service on the company's system at the end of the year was 36,345, an increase of 11,798 during the twelve months. The company's system now serves an area of 87,159 sq. miles, with a population of about 9,158,000 people. The total number of telephones in service increased during last year from 105,828 to 106,208; the number of average daily calls from 1,103,965 to 1,385,094, and the length of wires from 483,431 to 525,583 miles.

China.—RADIO-TELEPHONY.—Preparations for a radio-telephone service between Shanghai and Nanking are being made by the Ministry of Communications. It is anticipated that the new service, which is a first step towards linking the East with the capitals of Europe, will be inaugurated about October.—*Reuter* (Nanking).

Corstorphine.—AUTOMATIC EXCHANGE COMPLETED.—The new Corstorphine automatic telephone exchange equipped for 680 lines, forming part of the Edinburgh automatic telephone network, was brought into service recently. The equipment has been supplied and installed by Messrs. Siemens Brothers and Co., Ltd., who have also been responsible for all the other ten exchanges in this area.

Germany.—STATE BROADCASTING.—The decision, announced officially on July 29th, to abolish the form of privately and municipally owned companies, under which German broadcasting has been operated hitherto, and to place the service wholly under Government ownership, follows close upon the conversion of Norwegian organisation from private enterprise to State control, though the systems pertaining to the respective countries will have many points of difference, says *World-Radio*. In our own Dominions, Canada and Australia have already elected to follow the scheme adopted by Great Britain. In other parts of the Empire serious investigation into existing methods is taking place.

Great Britain.—RADIO EXCHANGES.—Notts County Council has granted permission to Broadcast Listeners' Service, Ltd., to erect wires across county roads at Mansfield Woodhouse for a relay service for that town.

Mr. H. Davey, manager at Ramsgate of the Broadcast Relay Co., has applied to the Birchington-on-Sea Parish Council for consent to establish a service there; objection has been taken to the use of overhead wires.

Barnstaple Town Council is considering a draft agreement with Messrs. Simpkins & Bickford.

Trowbridge Urban District Council has promised Broadcast Listeners' Service, Ltd., that if a canvass to be made by the company is satisfactory the company's application will be favourably considered.

THE TELEPHONE SERVICE.—The number of telephone stations in the Post Office system was 2,085,306 at the end of July, as compared with 2,079,649 at the end of the preceding month. According to *The Times*, the total number of inland trunk calls for the month of April (the latest statistics available) was 10,460,788, representing an increase of 344,522 or 3.4 per cent. on the total for April, 1931. International calls in April last numbered 98,284 (incoming 48,201 and outgoing 50,083), as compared with 93,828 (incoming 48,673 and outgoing 45,155) in the previous April.

Holland.—RADIO RECEIVERS.—An official statement shows that at the end of June, 1932, there were 291,926 registered receiving sets in Holland. Receiving installations on the communal principal were shared by 256,464 people, says *World-Radio*. The proportion of listeners to the population is sixty-nine for 1,000. No licence is necessary for a receiving set in Holland, and registration cannot be enforced.

Newcastle-on-Tyne.—CAFÉ TELEPHONES.—Messrs. Binns, Ltd., have introduced into their Market Street Café a telephone system which is claimed to be the first of its kind in the North of England. From any of the 110 tables in the café it is possible to receive and make local and trunk calls, and also to telephone any of the departments in the store.

South Africa.—TELEPHONE SERVICE EXTENSION.—The Anglo-South African telephone service was extended last Monday to include Pretoria and Johannesburg. *The Times* states that until this week the service, available from all places in this country, had been restricted in South Africa to the southern area of the Cape Province, including Capetown, Port Elizabeth, and De Aar, with a total of about 21,500 subscribers. The charge for communication with the extended area will be the same as that applied at the opening on February 1st of the Anglo-South African service—£6 for the first three minutes and £2 for each additional minute. The hours during which the service will be available at present are from 7.30 a.m. to 12.30 midday, but if the traffic should justify an extension of this period the Post Office here would consider the matter. The service is provided in this country entirely by the British Post Office. Calls are carried by land line to the transmitting station at Rugby, and the British receiving station is at Baldock, Herts. At the South African end the service is operated by the Overseas Communications Company of South Africa with a transmitting station at Klipheuval and a receiving station at Milnerton. The land lines in the Union are under the control of the South African Post Office. Speech over the extended service is reported to be perfectly clear and satisfactory.

Sweden.—TELEPHONY.—The State Telegraph and Telephone Department reports considerable progress and expansion during the past year. The number of telephones at the end of 1931 was 546,433, and the total number of calls was 823 millions, against 799 millions for the preceding year. The radio broadcasting activity also increased, the number of licence holders at the end of the year being nearly 550,000. A large new telephone cable between Stockholm and Malmoe has been completed, and two new all-automatic telephone exchanges in Stockholm and Gothenburg have been opened. The profit of the department for the past year increased by over one million kronor (£51,282) to 26.2 millions (£1,343,590).

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia. — MELBOURNE. — September 26th. City Council. Totally enclosed metal-clad 6,600-V switchgear. (A.X. 11435.)*
September 27th. Vitreous resistances. (A.X. 11412.)*
October 4th. Posts and Telegraphs Department. Switchboard and instrument plugs. (A.X. 11427.)* Instrument cords. (A.X.11428.)*
October 11th. Condensers. (A.X. 11436.)*
SYDNEY.—September 26th. Miniature-type control gear for Pyrmont power station. (A.X. 11439.)*

Barking.—August 26th. Electricity Department. E.h.p. switchgear and 230-kW rectifying equipment. (July 29th.)

Birmingham.—August 13th. Watch Committee. Installation of electric lighting, power supply, and underground cabling at Perry Barr fire station, College Road. Mr. H. H. Humphries, city engineer, Council House (deposit £3).

Galloway.—August 30th. Galloway Water Power Co. Construction of Tongland aqueduct. Sir Alex. Gibb and Partners, Queen Anne's Lodge, Westminster, S.W.1 (deposit £10 10s.).
August 23rd. Foundations and steelwork at Tongland power station. Sir Alex Gibb and Partners (deposit £10 10s.).

East Lothian. September 12th.—County Council. Various works, including electrical installation, at new school, Prestonpans. Messrs. R. and A. K. Smith, 4, Forres Street, Edinburgh.

India.—SIMLA.—October 4th. Four 3-ton level luffing electric quay cranes, portal type. (A.X. 11447)*

Kettering.—September 1st. Electricity Department. Renewal of positive battery plates. (See this issue.)

Leeds.—August 20th. West Riding Mental Deficiency Committee. Electricians' work at Oulton Hall, Oulton. County architect, County Hall, Wakefield.

Manchester.—August 25th. Electricity Department. Boilers, &c., for Stuart Street power station, Bradford. (July 29th.)
August 16th. Electric bed lift, at Withington Hospital and Institution, West Didsbury. City architect, Town Hall (deposit 10s.).
August 29th. Testing equipment and 6,600-V sub-station switchgear. (See this issue.)

New Zealand.—WELLINGTON.—September 27th. Public Works Department. Insulators. (A.X. 11443.)*

Northern Ireland.—BELFAST.—August 15th. Electric lighting installation at refuse destructor works, Laganbank Road. City surveyor, City Hall.

Oldham.—September 15th. Public Assistance Committee. Lamps and fittings for the Institution, Rochdale Road. Public assistance officer, Rochdale Road.

Plymouth.—August 29th. Corporation. Electricians' materials, &c. Mr. R. J. Fittall, town clerk, Municipal Buildings.

South Africa.—JOHANNESBURG.—September 6th. Rand Water Board. One 1,850-kW turbo-generator. (A.X. 11426.)*
August 25th. City Council. Porcelain insulators. (A.X. 11424.)* Weatherproof copper wire. (A.X. 11425.)*
September 15th. Two 1,080-kVA transformers. (A.X. 11445.)*
September 19th. South African Railways and Harbours. Lamps. (A.X. 11446.)*
CAPE TOWN.—August 24th. Electricity Department. Cables. (A.X. 11423.)*
September 14th. Electrically driven pumping equipment. (G.X. 11715.)*

Southampton.—August 31st. Corporation. Electrically driven centrifugal pump. Borough engineer, 33-35, French Street, Southampton (deposit £3 3s.).

Southend-on-Sea.—September 8th. Electricity Department. H.p. and l.p. cables. (August 5th.)

Sunderland.—September 5th. Corporation. Insulated cable and wire, meters and lamps. (See this issue.)

Swansea.—September 8th. Electricity Department. Steam-raising plant. (July 29th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Bridlington.—Town Council. Accepted. Electrical siren (£30).—Gent & Co., Ltd., Transformer and switchgear in connection with the supply to the Spa (£319).—A. Reyrolle & Co., Ltd.

Carlisle.—City Council. Accepted. Wireless installation at the Fusehill Institution.—J. Keenan.

Chester.—Electricity Committee. Recommended. Motor generator for installation in the hydro-electric works for conversion of d.c. to a.c. (£986).—Metropolitan-Vickers Electrical Co., Ltd.

Daventry.—Town Council. Accepted. Two Diesel pumping engines for the Dodford water pumping station.—Blackstone and Co., Ltd.

Dewsbury.—Electricity Committee. Accepted. Conversion of 9 motors from d.c. to a.c. (£102).—Wards & Co., (Dewsbury), Ltd.

Douglas (I. OF M.).—Electricity Committee. Accepted. Additional feed tank and pipe work at Pulrose power station.—Richardsons, Westgarth & Co., Ltd.

Dumfries.—Town Council. Accepted. 30-kW transformer required for the Creswell supply (£44).—Hackbridge Electric Construction Co., Ltd.

Falkland.—Town Council. Accepted. Electrical work at 54 new houses (£256).—J. Littlejohn.

Glasgow.—Electricity Committee. Recommended. Switchgear (£2,208).—M. & C. Switchgear, Ltd.
Markets Committee. Accepted. Installation of electric lifts at fruit market (£405).—Glasgow Engineers, Ltd.
Transport Committee. Accepted. Panels for d.c. sub-station feeders.—English Electric Co., Ltd.

Great Yarmouth.—Electricity Committee. Accepted. Water screening plant at power station (£808).—Babcock & Wilcox, Ltd,

Halifax.—Town Council. Accepted. Modification of boilers at the electricity works (£7,500).—Babcock and Wilcox, Ltd. Renewal of electric lighting system at Bankfield Museum and Library (£99).—J. Harrison & Co. Installation of electric lighting at Shay Lane houses (£73).—J. Pilling & Co.
Public Assistance Committee. Accepted. Installation of electric lighting at Gibbet Street Institution (£308).—Thomas & Akroyd.

Leicester.—Tramways Committee. Accepted. Special trackwork (£1,780).—Hadfields, Ltd.

Northumberland.—County Council. Accepted. Renewal of storage batteries (£86).—Tudor Accumulator Co., Ltd.

Rugby.—Urban District Council. Accepted. Cable.—W. T. Henley's Telegraph Works Co., Ltd. (£101); Derby Cables, Ltd. (£448).

Salford.—Electricity Committee. Recommended. Dust removal and vacuum cleaning plant at Agecroft power station (£680).—Davidson & Co., Ltd.

Wallasey.—Ferries Committee. Recommended. Electrical installation in the booking hall, stage and bridge, Seacombe Ferry improvement (£1,072).—R. J. Chatham.

Weymouth.—Town Council. Accepted. Transformer kiosk for the supply to the Whitehead Torpedo Co., Ltd. (£619).—English Electric Co., Ltd.

Forthcoming Events

National Radio Exhibition.—August 19th-27th. Olympia, S.W.

Institution of Mechanical Engineers.—August 19th-September 18th. Canadian summer meeting.

British Association.—August 31st-September 7th. York. Annual meeting.

Institute of Metals.—September 3rd-October 8th. Visit to U.S.A. and Canada, to include annual autumn meeting.

Association of Public Lighting Engineers.—September 5th-8th. Blackpool. Annual meeting and conference.

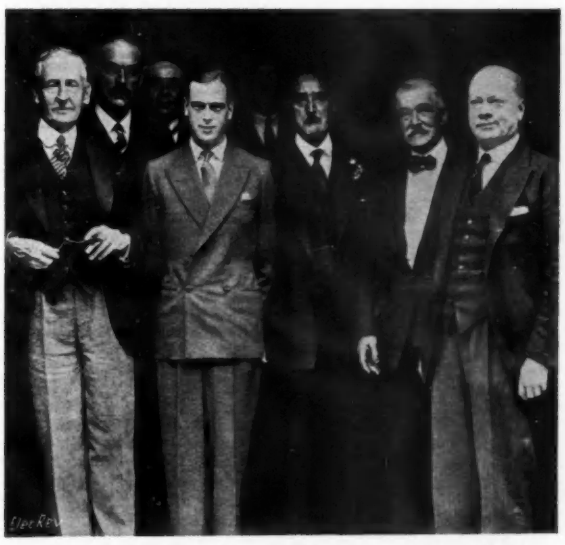
Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the name and address of the makers of the following :—

BIRUM vacuum cleaner.

EZBELENT pleating machine (makers or agents).



Prince George attends a "Holophane" colour-lighting demonstration

Front row (left to right): Lord Ernest Hamilton; Prince George; Mr. H. Hepworth Thompson (managing director); Major Robert Woodhouse; Lord Fairfax. Back Row: Mr. L. E. Jones; Mr. Ife; Mr. Field

Notes

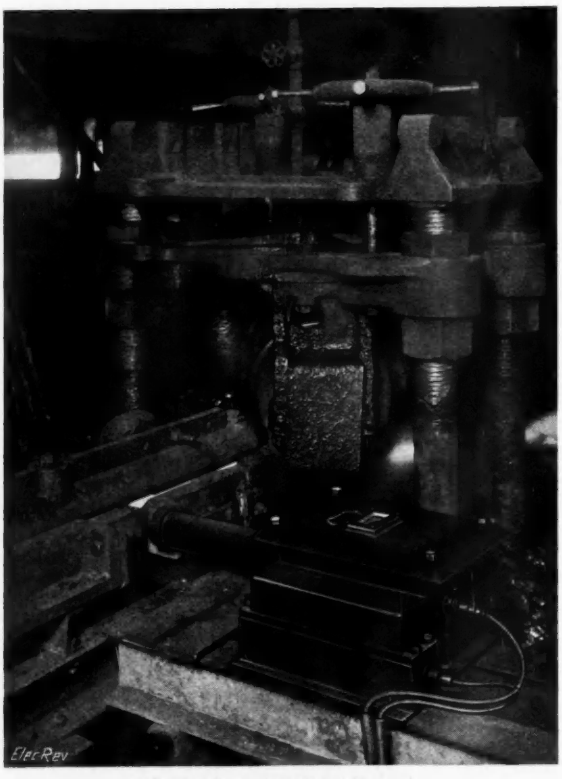
The British Association

The annual meeting of the British Association for the Advancement of Science will be held in York from August 31st to September 7th. The presidential address will be delivered by Sir Alfred Ewing on the opening day, and other items which are likely to be of interest to our readers are as follows: The presidential address to Section G—Engineering, to be delivered by Prof. Miles Walker, will bear the title, "The Call to the Engineer and Scientist." Other papers in this section are: "Distribution and Utilisation of Power from the Grid," by Mr. R. Borlase Matthews; "An Engineer's Review of the Soviet Enterprise," by Mr. A. P. M. Fleming. Discussions will take place on the electric propulsion of ships, and the preparation and uses of statistics in business, while Sir Seymour B. Tritton (steam power), Mr. F. Lydall (electric power), and Sir Henry Fowler (oil-engine power) will contribute to a discussion on railway traction. Mr. C. C. Paterson will give a discourse on "Uses of the Photo-electric Cell."

Photo-electric Control in Tube Mills

Very rapid handling of the hot steel strip from which welded-steel tubes are rolled is needed right from the moment when the heated strip is pulled out of the furnace with a temperature of over 1,350 degs. C. to the end of the process when the finished tube moves down the cooling rack at the other end of the tube mill plant.

The distance between the tail end of one tube and the nose of the next following tube is often only about three feet. The



"Osram" photo-cell equipment

slightest error in timing by the operator will result in a temporary stoppage due to collision between the tubes. Mechanical means to check these operations and to prevent the tubes from colliding have failed, as any lever or electrical appliance that was struck by the hot tubes travelling at a great speed in rapid succession wore out within a very short period of time.

The whole matter was therefore investigated by the General Electric Co., Ltd., with a view to developing photo-cell equipment for carrying out these operations at the works of Messrs. Stewarts & Lloyds, Ltd. The ray given out by these hot tubes will operate a photo-electric cell placed within a few feet as they travel from the sizing rolls through the cross-rolls to the cooling bank. The current set up in the photo-cell is amplified through an "Osram" valve and relays to operate an electrical contactor, which closes the circuit of a powerful solenoid. By means of the solenoid the releasing shutters, which were originally operated by hand, are automatically operated at exactly the right moment, and collision of tubes, &c., is prevented.

At the same time each tube is counted by its ray being picked up by another photo-cell equipment which operates a solenoid-operated counter. Further, optical warning signals, consisting of red and green lights, are installed to indicate to the men at the furnaces and the racks when the line is safe for sending along another tube or when the passage is blocked.

Provision can also be made to test the temperature of the strips when leaving the furnace or of the tube at any time of its travel by means of photo-electric temperature recorders.

The photo-cell equipment described will operate directly from either a.c. or d.c. circuits. Maintenance charges are reported to be negligible, as no attention is required apart from the cleaning of filters or lenses every few days, and the apparatus is robust and reliable. The power consumed by each equipment is about 2 kWh per week.

Electrical Association for Women

At a joint meeting of the North West Midlands Branch of the Electrical Association for Women and the North West Midlands District Electrical Development Association at Stoke-on-Trent, Mr. J. F. Ford lectured on "Water Heating Apparatus." He dealt more particularly with the "Circulator" manufactured by Santon, Ltd., and gave a detailed explanation of the method of fitting these appliances to existing bathroom cylinders for heating the water electrically when the coal fire is not in use.

E.A.W. members and representatives of women's institutes recently visited the Bedford rural demonstration area. At a luncheon at the Bridge Hotel, Bedford, the chairman of the Electricity Committee, Alderman Miller, welcomed the visitors, for whom Lady Swaythling and Mrs. Wintringham replied. The showrooms at Electricity House were then inspected, after which the party proceeded to Felmersham Grange, where they were entertained at tea by Mr. Sydney R. Wells, M.P., and Mrs. Wells prior to making a tour of the cottage installations in the village and inspecting the demonstration van where cookers and other appliances were being shown. The return journey was through the north and west end of the area.

Agricultural Electricity in Japan

The Bureau of Electricity of the Japanese Ministry of Communications has recently issued a report which shows that as a result of the general industrial depression and the impoverishment of the farmers, the use of electricity in farming operations in Japan has slightly decreased, the capacity of the motors and other apparatus in use having declined from 87,655 kW in 1930 to 84,702 kW last year. The 1931 total is made up of 35,268 electric motors aggregating 67,200 kW, 2,184 heating appliances (4,492 kW), 472,739 lamps for exterminating noxious insects (12,940 kW) and 1,396 electric fans (70 kW).

Appointments Vacant

Assistant visiting teacher of electrical engineering for the London County Council.

Borough electrical engineer for Loughborough Corporation.

(See our advertisement pages to-day.)

Useful Meter Formulæ

In a recent issue of *Elektrotechnische Zeitschrift* Herr Carl Liehr demonstrates the bases of simple formulæ for calculating the time for one revolution of the last dial of an electricity meter, and also the time required to attain the maximum reading of the meter at full load. The only data required are the rated capacity of the meter; the number of meter dials, or rollers; and the position of the decimal point. It is not necessary to know the gear ratio of the meter. The time t minutes in which the last dial makes one revolution is given by: $t=60/(P\times10^{a-1})$; where P=rated load or meter in kW; and a=number of figures after the decimal point in the meter reading. It should be noted that a may be positive, zero, or negative, *e.g.*, $a=2$ if the meter reads to 0.01 kWh; 0 if the meter indicates kWh; and -2 if the meter reading is in hundreds of kWh.

The time required to reach the maximum reading of the meter at full load is: $T=10^b/P$ hours; where b=number of meter dials or rollers in front of the decimal place. If the meter has five rollers and reads hundreds of kWh, the value of b is, of course,, 5+2=7. *Examples*: (1) Meter rated at 220 V, 5 A, with five rollers and two decimal places. In this case, $P=220\times5/1{,}000=1.1$ kW; $a=2$; $b=3$. Hence, $t=60/(1.1\times10)=5.45$ min.; and $2+10^3/1.1=909$ hours. (2) Three-phase meter for 3×6,000 V, 3×10 A; five dials; multiplication factor 10. In this case: $P=\sqrt{3}\times6{,}000\times10/1{,}000=104$ kW; $a=-1$; $b=6$. Hence: $t=60/(104\times10^{-2})=57.7$ min.; and $T=10^6/104=9{,}615$ hours.

Track Circuit Installation

A further specification in the series of British Standard Specifications for railway signalling apparatus has been published. The new specification, No. 456-1932, for track circuit installation, gives the dimensions of every component of the sets of insulations for bullhead and flat-bottom rails, together with the permissible tolerances. The specification contains twelve illustrated plates in addition to several clauses of a more or less general character.

The specifications for rail joint insulations which have been worked to in the past by the various railways and contractors have differed slightly in several respects, and their unification should therefore be of considerable assistance without in any way interfering with current practice in all cases where British standard rails are used. Copies of this specification may be obtained from the Publications Dept., British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 2d. post free.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

In our issue of July 15th, we referred to the organisation in Sydney, Australia, of an Electrical Apparatus Safety Board. We learn from the *Electrical Trader of Australasia* that the following gentlemen have been appointed to the committee to carry out the organisation:—Mr. A. A. Tangie, electrical installation inspector to the Sydney City Council, who will represent the Sydney and Newcastle electricity undertaking; Mr. N. L. Nock, of the Retailers' Association of N.S.W., to represent retail sellers of electrical goods; J. L. Hendry, appointed by the electrical section of the Chamber of Manufacturers to represent manufacturers of electrical apparatus; Mr. W. G. Wing, appointed by the electrical section of the Chambers of Manufacturers to represent manufacturers of radio apparatus; Mr. G. K. Dunbar, appointed by the Electrical Association of N.S.W. to represent the wholesale houses in the electrical trade; and Mr. F. L. Page, appointed by the Electricity Supply Engineers' Association of N.S.W. to represent the suburban and rural electricity supply undertakings.

[*Edw. A. Doo*

Mr. W. S. Verrells (chairman and managing director) and Mr. E. K. Cole (technical director) of Messrs. E. K. Cole, Ltd., to whose progress during the past seven years we refer on page 227 of this issue

Guildford Town Council has made the following increases in salary:—Mr. S. F. Whiting, station engineer, from £337 10s. to £368 15s. from August 1st, and to £400 from April 1st next; Mr. W. F. May, mains superintendent, from £312 10s. to £356 5s., and to £400 from April 1st; Mr. H. R. Billing, installation superintendent, from £310 to £335, and to £360; Mr. C. A. Walker, meter superintendent, from £300 to £330, and to £360; Mr. F. Tait, assistant mains superintendent, from £262 10s. to £294 15s.; and to £327; the salaries are subject to the five per cent. deduction in respect of salaries of over £150 per annum. An honorarium of £100 has been voted to the borough electrical engineer, Mr. W. E. Affleck.

Mr. J. H. Beaumont Robins, B.Sc. (Eng.) Lond., formerly sales manager to the British Aerotechnical Co., Ltd., and Aeroto, Ltd., has been appointed by Messrs. Davidson & Co., Ltd., Belfast, as publicity manager.

Mr. J. R. Thomas, manager of the Lamp Department of the Edison Swan Electric Co., Ltd., driving from the competition tee at the sixth hole at the Hadleywood Golf Course on August Bank Holiday, holed out in one. Mr. Thomas accomplished the same feat at the same hole last year.

Mr. R. C. Moor, traffic superintendent at Stockton-on-Tees, has been appointed by Hull Corporation as assistant traffic manager.

In consequence of the death of the late secretary, Mr. W. Kerfoot, the directors of British Insulated Cables, Ltd., have made the following staff changes:—Mr. A. Crook has been promoted to the position of secretary; Mr. A. Mills has been made chief cashier; Mr. W. H. McFadzean has been appointed chief accountant; and Mr. F. Waine becomes chief clerk. Messrs. Crook and Mills have both had 30 years' service with the company.

Mr. L. F. S. Sington has severed his connection with the Greengate & Irwell Rubber Co., and is now representing Messrs. William Geipel, Ltd., and the S.A.M. Pump Co. at "Rosecliff," Victoria Park, Wavertree, Liverpool.

Lord Ampthill has resigned as chairman and director of Baird Television, Ltd., and **Mr. F. R. A. Shortis** has also resigned from the board. **Sir Harry Greer** has been elected chairman.

On the occasion of his marriage to Miss Barbra Linkie, **Mr. Douglas Campbell,** representative for W. T. Henleys Telegraph Works Co., Ltd., in the Irish Free State, was presented with an address and cheque by electrical friends.

Mr. E. L. Guilford, information officer at the North Regional headquarters, Manchester, of the British Broadcasting Corporation has been appointed station director, Newcastle-upon-Tyne.

Blackpool Corporation Committee fixed the salary of **Mr. Charles Furness,** borough electrical engineer, at £1,600 (£350 to represent his services in connection with the Autumn illuminations), subject to temporary reductions under the Whitley Council scale, Mr. Furness to act in a consultative capacity under the title of consulting transport engineer following the appointment of a new transport official. Councillor. E. Holt moved the matter back at a meeting of the Town Council, on August 3rd. He did not suggest Mr. Furness was not a good official. Mr. Furness was very capable and had served very faithfully. But if the General Purposes Committee had known the separation of the two positions would cost the ratepayers £1,000 a year for three or four years they would not have supported it. Councillor Millington said Mr. Furness would not be overpaid, but they ought to consider whether it was wise to advertise for a transport manager at this stage. The amendment was carried by 22 votes to 13.

Among the students of the Cardiff Technical College who sat for the University of London B.Sc. Engineering examination, we note the name of **Mr. Theodore R. Stretton,** son of Mr. Theodore Stretton, M.I.E.E., of Cardiff, who passed with first-class honours. Two years ago Mr. T. R. Stretton was awarded the Duddell scholarship by the I.E.E.

Mr. F. Morrell, of the Ashton-under-Lyne Muncipal Electricity Department, who was recently married, was presented by his colleagues with a fireside chair and an alarm clock.

Mr. W. Blythe, who has served with the Cleveland and Durham Electric Power Co., and its associated companies, and has now been for some years with the Burnley Corporation Electricity Department, has been awarded the B.Sc. (Eng.) in the examination of the London University held in July.

Mr. C. H. G. Cowell, who for some years represented the Maybrook Electrical Co., Ltd., has now joined Messrs. Young and Wildsmith, Ltd., of 35, Little Russell Street, W.C.1.

Obituary

Mr. A. F. Galpin.—The death occurred on August 6th, at the age of 66 years, of Mr. Albert Frederick Galpin, who had been in the employ of Messrs. Home and Rowland, electrical engineers, of Charlton, London, S.E.7, for more than 28 years, for the greater part of this time as foreman of the armature winding department. He had previously acted in a similar capacity with Messrs. Johnson & Phillips, Ltd., Charlton.

Mr. C. J. Pegley.—We regret to announce the death at the age of 56 of Mr. Charles Joseph Pegley, founder and managing director of Vac Tric, Ltd. He entered the electrical industry in 1923, first trading in vacuum cleaners of foreign make. He realised the need for an all-British product, and in 1926 commenced manufacturing.

Mr. C. J. Hunt.—The death occurred in a nursing home in Edinburgh on August 3rd of Mr. C. J. Hunt, assistant general manager of Bruce Peebles and Co., Ltd., Edinburgh, following an operation a few weeks ago. Mr. Hunt was well known in Edinburgh and London, and his death will be regretted by a wide circle of friends, both in this country and abroad. He joined Bruce Peebles & Co. in 1906 and was continuously associated with the company from that time. His early electrical training was received as a pupil of Johnson & Phillips, Ltd., and he subsequently carried out important electrical contracts in various parts of the country. Mr. Hunt leaves a widow and two children.

The late Mr. C. J. Hunt

Count de la Valette.—The death is announced from Paris, at the age of 70 years, of Count de la Valette, the founder of the industrial electricity laboratory at the Arts et Métiers, Paris, and the designer of one of the first h.t. magnetos for motor vehicles.

Will.—Mr. Arthur Round, a director of the Young Accumulator Co., left £9,367 (net personalty £7,210).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

F. O. & H. S. Hughes, Ltd.—Private company. Registered August 3rd. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of and dealers in wireless apparatus, cabinets, loudspeakers, &c. The permanent directors are: F. O. Hughes. 28, Conway Avenue, Tile Hill, Coventry, and H. S. Hughes, 4, Ashdown Avenue, Leicester. Registered office: 1, Equity Road, Leicester.

H. Payne (Coventry), Ltd.—Private company. Registered July 30th. Capital, £1,500 in £1 shares. Objects: To carry on the business of manufacturers of and general dealers in all kinds of electrical and acoustic instruments and machines, including gramophones, radio-gramophones, wireless and television sets, &c. The directors are: H. Payne, Mrs. Annie Payne, and Vera M. Payne, all of 5, Jesson Street, Coventry. Registered office: 5, Jesson Street, Coventry.

Davey, Paxman & Co. (Colchester).—Public company. Registered August 2nd with a nominal capital of £50,000 in £1 shares. Objects: To acquire the business until recently carried on at Colchester and elsewhere by Davey, Paxman & Co., Ltd., and to carry on the business of mechanical, electrical, mining, water supply and general engineers, manufacturers of steam engines, oil engines, locomotives, motor vehicles, refrigerating machines, &c. Total purchase price, £83,640 (£5,000 cash and £78,640 debenture stock). The directors are: Rt. Hon. Viscount Goschen, 25, Rutland Gate, S.W.7; P. A. Sanders, Lexden Park, Colchester; E. P. Paxman, St. Clare Road, Colchester; F. Jarrett, Bucklands, 18, Warren Road, Purley, Surrey; and J. D. Dean, White Lodge, Mersea Road, Colchester. Registered office: Standard Iron Works, Colchester.

F. & R. G. Parks (Lamp Shades), Ltd.—Private company. Registered July 29th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in lamps and lampshades, &c. The subscribers are: F. G. Parks, 28, Langside Crescent, Old Southgate, N.14, and Miss Rose G. Parks, 28, Langside Crescent, Old Southgate, N.14. Solicitors: Cooper Bake Fettes Roche & Wade, 6 & 7, Portman Street, W.1.

Clifford Pressland (Sales), Ltd.—Private company. Registered August 5th. Capital £1,100 in £1 shares (1,000 preference and 100 ordinary). Objects:— To market and deal in articles and things covered by letters patent already granted or to be granted to C. Pressland, and to carry on the business of electrical and motor engineers and contractors, suppliers of electricity, etc. The directors are: C. Pressland (permanent), The Croft, 107, High Street, Hampton, and C. F. Richards, 70, Tenterden Drive, Hendon, Middlesex. Solicitors: Edgar Cozens, 51, High Street, Hampton, Middlesex.

Radiomonic, Ltd.—Private company. Registered August 6th. Capital, £3,000 in £1 shares. Objects: To carry on the business of manufacturers of, and dealers in, electrical and other instruments and materials used in connection with television, wireless telegraphy and telephony, scientific and technical instruments, &c. The directors are: H. Levy, 26, Luitpold Street, Berlin, Germany; A. Gerson, 25, The Fairway, North Wembley, Middlesex; and A. Salkind, 3, Ganghoferstr, Steglitz, Berlin, Germany. Registered office: Regency House, Warwick Street, Regent Street, W.1.

Baxter & Caunter, Ltd.—Private company. Registered August 6th. Capital, £10,000 in 4,000 ordinary and 6,000 5 per cent. cumulative preference shares of £1. Objects: To carry on the business of electricians, electrical and motor engineers, contractors and manufacturers, &c. The subscribers are: C. E. Cooper and Miss Sara K. Harley, both of 54, Chancery Lane, W.C.2. Registered office: Darnoc House, 33-7, Alfred Place, W.1.

Mains & Allied Radio Supplies, Ltd.—Private company. Registered August 6th. Capital, £5,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in, wireless and electrical apparatus and accessories of all kinds, &c. The subscribers are: B. L. Diddams and H. Handley, both of 7, Ely Place, E.C.1. Secretary (pro tem): B. L. Diddams. Solicitors: de Buriatte & Bowen, 7, Ely Place, E.C.1.

Tyrela Electric, Ltd.—Private company. Registered August 8th. Capital, £5,000 in £1 shares. Objects: To acquire the right to use jointly with Tyrela Gramophones, Ltd., Tyrela Radio, Ltd., and Tyrela Furnishing Co., Ltd., the registered trade mark "Tyrela," and to carry on the business of manufacturers, importers, and exporters of and dealers in wireless telegraphy, television and telephone apparatus and wireless apparatus, electrical apparatus, &c. The directors are: E. J. F. Tyler, Amberley, Fullers Avenue, Woodford Green, Essex, and B. E. J. Tyler, 7a, Victoria Parade, Muswell Hill, N.W. Registered office: 21, East Road, City Road, N.1.

G. R. Spicer & Co., Ltd.—Private company. Registered July 29th. Capital, £200 in £1 shares. Objects: To carry on the business of engineers, founders, manufacturers of and dealers in wireless, electrical and mechanical apparatus, &c. The directors are: G. R. Spicer, 89, Avery Hill Road, New Eltham, S.E.9, and H. T. Begley (chairman), 31, Forest Hill Road, East Dulwich, S.E.22. Registered office: 89, Avery Hill Road, New Eltham, S.E.9.

Radio Service (Southern), Ltd.—Private company. Registered August 2nd. Capital, £500 in £1 shares. Objects: To acquire the business of a radio and wireless dealer carried on by S. Shepperdson, at 29, Castle Street, Hastings, as "Southern Radio Service." The subscribers are: S. Shepperdson, 75, Nottingham Road, Leyton, E.10, and C. F. Shepperdson, 36, Wadham Avenue, Walthamstow, E.17. Registered office: 29, Castle Street, Hastings.

Returns of Electrical Companies

Lang Electrical Co., Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1931 (filed April 29th, 1932). 51 shares taken up. £51 paid. Mortgages and charges, nil.

Pasco (Liverpool), Ltd.—Capital, £400. Return dated December 31st, 1931 (filed April 29th, 1932). All shares taken up. £400 paid. Mortgages and charges, nil.

Torque Transformer Syndicate, Ltd.—Capital, £2,400 in £1 shares. Return dated January 14th, 1932 (filed April 16th, 1932). 2,200 shares taken up. £2,200 considered as paid. Mortgages and charges, none registered.

Ferryside Electric Supply Co., Ltd.—Capital, £1,200 in £1 shares. Return dated December 31st, 1931 (filed April 18th, 1932). All shares taken up. £1,000 paid. Mortgages and charges, nil.

Unity Lamp & Accessories, Ltd.—Capital, £4,500 in 3,000 ordinary and 1,500 deferred shares of £1 each. Return dated July 31st, 1931 (filed April 25th, 1932). 2,200 ordinary and 1,500 deferred shares taken up. £3,425 paid (being £1 per share on the deferred, and 17s. 6d. per share on the ordinary). Mortgages and charges, £1,515.

R.R., Ltd.—Debenture charged on Eastnor House, Lloyds Place, Blackheath, and Ariel Works, Grotes Place and Eliot Place, Blackheath, with plant and machinery, and the company's undertaking and property, present and future, including uncalled capital dated July 25th, 1932, to secure all moneys due or to become due from the company to Lloyds Bank Ltd.

Ready Radio, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital dated July 25th, 1932, to secure all moneys due or to become due from the company to Lloyds Bank Ltd.

Waldron Electrical Manufacturers, Ltd.—Further charge on the company's undertaking and property, present and future, including uncalled capital, dated July 14th, 1932, to secure £22 and further advances not exceeding therewith £50. Holder: G. C. Jeremiah, Redlands, Queen's Road, Sketty, Swansea.

Hayward & Shepherd, Ltd.—Miss M. C. Walker, 23, Kildare Gardens, W. 2, was appointed receiver on July 29th, under powers contained in debenture dated January 19th, 1931.

Mainten Manufacturing Co., Ltd.—L. G. Darling 87-9, Aldgate High Street, E.C. 3, ceased to act as receiver or manager on July 27th.

Kitson Lights Pumps & Refrigerators, Ltd.—C. J. Pain, 18, Low Pavement, Nottingham, ceased to act as receiver and manager on July 29th.

Elven Mains Manufacturing Co., Ltd.—Capital, £200 in £1 shares. Return dated December 31st, 1931 (filed April 1st, 1932). 102 shares taken up. £102 paid. Mortgages and charges, nil. A return of allotments, made up to May 8th, 1932, shows a further 50 shares allotted for cash and fully called up, plus £4 per share premium.

United Electric Lamp Factories, Ltd.—Capital, £100 in £1 shares. Return dated December 10th, 1931 (filed March 22nd, 1932). 12 shares taken up. £12 paid. Mortgages and charges, nil.

Battery Manufacturers' Merchants, Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1931 (filed April 13th, 1932). 2 shares taken up. £2 paid. Mortgages and charges, nil.

Bastian & Allen, Ltd.—Capital, £5,000 in £1 shares. Return dated April 2nd, 1932. 1,603 shares taken up. £1,603 paid. Mortgages and charges, nil.

J. J. Marr & Co., Ltd.—Capital, £500 in £1 shares. Return dated April 19th, 1932. 400 shares taken up. £400 paid. Mortgages and charges, nil.

Rugby Electrical Engineering Co., Ltd.—Capital, £1,500 in 1,000 preference and 500 ordinary shares of £1 each. Return dated January 12th, 1932. 500 ordinary shares taken up. £500 paid. Mortgages and charges, nil.

Pullars Electric Co. (Brighton), Ltd.—Satisfaction in full on July 28th, of two charges dated July 1st, 1930, and September 1st, 1930, and three further charges dated October 23rd, 1930, March 4th, 1931, and December 16th, 1931, and registered July 8th, September 6th, and October 29th, 1930, and March 13th and December 19th, 1931, respectively. (According to the register of mortgages, the charges registered July 8th, September 6th, and October 29th, 1930, and March 13th and December 19th, 1931, originally secured £450, £300, £200, and further advances; £700 and further advances and £650 respectively.)

Particulars filed of debentures for not more than £5,000, authorised June 14th, 1932, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £3,600.

Aurolite Electrical Supplies, Ltd.—C. A. Hannam-Harris, 28-29, St. Swithin's Lane, E.C.4, was appointed receiver and manager on July 19th, under powers contained in debenture dated July 27th, 1926.

Atlas Electric and General Trust, Ltd.—Satisfaction in full on February 9th, 1932, of trust deed dated March 12th, 1909, and trust deeds supplemental thereto, dated February 10th, 1922, to January 19th, 1928, and registered March 13th, 1909, to January 27th, 1928, securing an aggregate amount of debenture stock for £2,662,945 and premiums relating thereto. Notice filed July 23rd, 1932.)

City Notes

The Anglo-Argentine Tramways Co., Ltd., held its annual meeting on August 5th, the Duke of Atholl (chairman), who presided, in presenting the report and accounts (ELECTRICAL REVIEW, August 5th, p. 204), the chairman said that the outstanding feature of the year's operations was a further heavy decrease in traffic and the consequent fall of £484,126 in passenger receipts, which had already suffered badly in the two preceding years. The principal cause was the intensified competition from motor vehicles and especially from the collective taxicabs. Substantial economies in administration and working had been effected. Following the unsuccessful conclusion in January last to their negotiations with the Provisional Governments for tariff adjustments, he had visited Buenos Aires to investigate matters. Concessions under which the recognised systems were working were now quite unworkable, and the system of granting concession upon concession had reached such a pitch that even the legitimate organisations were cutting each other's throats. The Lord Mayor of Buenos Aires decided to scrap the past and form a corporation in which all previous interests were to be amalgamated, each having shares in proportion to the assessed assets which they were able to put into the new corporation. The new body would be managed by a board composed of directors elected partly by the municipality and partly by the shareholders, the latter being in the majority, the operative control being under an expert appointed by the board. He hoped that it would not be long before a satisfactory conclusion was reached. The President of the Republic had promised his support to any useful scheme that would achieve the desired end. The company's system was being well and economically run. Argentina and Great Britain were passing through critical times. Fiscal questions were prominently to the fore, and the safety of capital, whether it was Argentine or British capital, was being put to the test. Great Britain had some £600,000,000 invested in Argentina, and that country could not forget all we had done to help or the value of our markets to her producers. In these circumstances both Governments must and would weigh their actions very carefully.

The American and Foreign Power Co. has announced that contracts were made in April last giving it the right to extend for one year the maturity date of the $50,000,000 of bank loans due on October 26th next. The sum of $30,000,000 borrowed from Electric Bond and Share (the parent company), and an additional $5,000,000 more recently borrowed, was funded during April by the issuance to Electric Bond and Share of the American & Foreign Power Co.'s note in the amount of $35,000,000. According to the *Electrical World*, the recent decline in the revenues of the company is not an accurate measure of the actual business done by the subsidiaries in the countries in which they operate. Depreciation in gold exchange equivalent of certain foreign currencies has had an increasingly adverse effect. In Argentina, Brazil, Chile, Colombia, Costa Rica, and Ecuador this depreciation in gold exchange equivalent of their national currencies is being accompanied by the imposition of restrictions on foreign exchange operations, with the result that some of the subsidiaries cannot remit in gold equivalent as much of the proceeds of their collections from customers as is required to meet their obligations in United States and other foreign currencies.

Parkinson & Cowan, Ltd., report a net profit for the year ended March 31st last of £1,122, as compared with £25,319 in the preceding year, to which is added £15,000 transferred from reserve, and £7,974 brought in, making £24,096. The preference dividend for the half-year to September 30th last absorbed £16,937, leaving £7,159, which it is proposed to carry forward. No ordinary dividend is paid, against 2½ in 1930-31. The report states that the company has suffered from lack of any marked improvement in commercial conditions in Australia, where it has large interests. It has been decided to write down the book value of certain investments, and to make other appropriations from reserve, as a result of which the reserve account now stands at £37,134 (against £122,033). There has been a contraction of turnover during the year in almost all departments, but the latest reports of progress in various directions afford ground for believing that a recovery may not be long delayed. Substantial economies have been introduced, of which the full effect is not apparent in the present accounts.

The British Electric Transformer Co., Ltd.—Meetings were held on August 8th when the proposed arrangement with Messrs. Crompton Parkinson, Ltd., and the scheme of reconstruction (ELECTRICAL REVIEW, July 22nd, p. 140) were approved by large majorities. Mr. A. F. Berry (chairman) said that complaint had been made by shareholders that it had apparently been found impossible to secure for the shareholders some share in the equity of the business. The directors had tried to obtain such a participation, but Messrs. Crompton Parkinson maintained that if, by their energy, advice, new methods of management and financial help, they were able to turn a loss into a profit, they were entitled to the reward, particularly if they guaranteed a fixed dividend to the existing proprietors. At the annual meeting the report and accounts were adopted.

A. G. Brown Boveri & Co.—The report for 1931-32 shows net profits of 111,000 frs., which has been carried forward, as compared with net profits of 5,550,000 frs. and a dividend of 8 per cent. in the previous year. The orders on hand in June were only 33 per cent. of what they were in June, 1930, the falling off being specially in the case of foreign business, which in favourable years provided about 80 per cent. of the orders necessary for profitable manufacturing.

The Consolidated Gas, Electric Light & Power Co. of Baltimore reports a gross revenue for the six months ended June 30th last of $14,600,748, as against $15,261,473 in the corresponding period of last year, and net earnings of $3,564,790 ($3,841,014). The earnings available for dividends on the common stock were $2,993,375, which is equivalent to $2.56 per share ($2.81).

The Yorktown (Camberley) & District Gas & Electricity Co. has announced an ordinary interim dividend at the rate of 6¼ per cent. per annum, less tax (same).

The Shropshire, Worcestershire & Staffordshire Electric Power Co., which has 625,000 £1 shares unissued, is making them into 325,000 new "B" ordinary and 300,000 6 per cent. cumulative preference shares. Power is being sought to issue the shares when necessary, but the *Financial Times* reports that no issue is contemplated at present. A meeting to approve the proposals will be held on August 19th.

The Pennsylvania Water & Power Co. reports that during the first half of the current year it earned the dividend paid on its capital stock ($1.50) 1.6 times. The net income for the six months was $1,034,686, and after payment of $644,772 to the stockholders in dividend, the surplus was $389,914.

The Brompton & Kensington Electricity Supply Co., Ltd., has declared an interim ordinary dividend of 3½ per cent., less tax. Last year the interim was 4⅛ per cent., but under the London Electricity (No. 2) Act, 1925, the ordinary dividend is now fixed at 7 per cent. per annum.

W. Canning & Co., Ltd., have announced an interim dividend at the rate of 5 per cent. per annum (same).

Clarke, Chapman & Co., Ltd., have announced an interim dividend on the ordinary shares of 2½ per cent., less tax (same).

The Lisburn Electric Supply Co., Ltd., has declared an interim dividend at 5 per cent. per annum.

The Westminster Electric Supply Corporation, Ltd., has declared an interim dividend of 2½ per cent. (actual), less tax, on account of the standard dividend on the ordinary stock. The dividend is to be paid on a larger amount of ordinary stock than last year, owing to the capitalisation and distribution of free reserves in December last.

Ruths International Accumulators, Ltd., reports that for the sixteen months to December 31st last the reduction in capital is reflected in the balance sheet. While the trading for the period is shown as resulting in a loss of £19,447 (as compared with a loss for the preceding twelve months of £25,855), the scheme of reduction of capital provided for the writing off of the estimated loss for the first half of the period covered by the accounts, which amounted to £16,060. The balance of loss (£3,387) is carried forward.

Stocks and Shares

TUESDAY EVENING.

IN spite of the fact that the holiday season is now in full swing, the Stock Exchange markets present a fairly animated appearance, and there is a good deal of business taking place in certain sections. A fairly comprehensive rise in metals and in commodities, coupled with a complete change of aspect in American financial conditions, have brought a surprising degree of animation, which is, outside the gilt-edged market, cheerful and optimistic. Here and there, factors of disappointment prevail. The Ottawa Conference has not yet done what it was expected to accomplish, though in this case, as with Lausanne, the after-effects may become more favourably regarded when they are seen in longer perspective. On the Continent, Austria has frankly admitted financial difficulties, and in South America the state of affairs in Argentina, Brazil and Chile continue to call for caution.

These are some of the bear factors in a situation which otherwise contains a good deal of hopefulness, accompanied by increased business.

The Yield upon Industrials

The markets with which these notes are particularly concerned present few features of outstanding interest in the current week. During July very considerable improvements were achieved by shares in the Home Electricity list, as well as by all the stocks which come anywhere near the gilt-edged area. It may be said that prices of the former are now resting after their sustained advance. Amongst gilt-edged stocks, a sharp fall in the price of the 5 per cent. Assented War Loan laid a check upon the optimism which had previously been such a feature in British Government securities. These stocks went back materially, and people who had been buying them with a view to their substitution for the 5 per cent. War Loan have finished their change-over orders for the time being. Cessation of this support served to emphasise the effect of profit-taking sales. Interest has widened, however, and Stock Exchange brokers find their clients are willing to pay attention to ordinary shares in first-rate industrial undertakings, more particularly when such shares offer attractive yields on the money. The first section of our price-lists shows the average yield on London Electricity supply shares to be a little under 4⅜ per cent., a return which, no more than six months ago, would have been regarded as too meagre for the investor to accept from shares in this category.

Preference Shares on Offer

On the Monday in this week the shares in a number of companies were quoted ex the interim dividends that will be paid during August. Amongst the London electricity supply shares, Charing Cross at 32s. have recovered part of the deduction. In the provincial group, Bournemouth at 70s. are the same price ex dividend as, a week ago, they were quoted cum dividend. Other shares in this group are practically unchanged. It may be of service to mention that several thousand Isle of Thanet Electric Supply 6 per cent. participating preference shares are available at 26s. 3d. Last year's profit of nearly £54,000 showed plenty of margin for the £17,000 required for the service of the dividend on these preference shares. The latter become entitled to participating rights when the ordinary have received 6 per cent. in any one year. After that, preference and ordinary share equally in any surplus distributed profits. The ordinary shares have received 4 per cent. per annum for

the past five years. Rumours to the effect that endeavours had been made to secure control of the company have recently been denied.

New Issues

The Shropshire, Worcestershire & Staffordshire Electric Company is making its unissued capital into 325,000 new "B" ordinary, and 300,000 6 per cent. preference shares. A meeting to pass the necessary resolutions will be held on Friday in next week, August 19th. It is understood that no immediate issue is contemplated, although in this connection the Government's ban upon new issues must be remembered. No permission has yet been given for this ban to be raised, but great is the curiosity as to when freedom will be restored to the companies and borrowers who have made all the necessary arrangements to appeal to the public for fresh money.

County of London new ordinary shares are 6s. 9d. premium, after touching 7s. premium. Edmundsons new preference keep steady at 23s. 9d. Central Electricity 4½ per cent. scrip gave way abruptly, the price falling from 7½ premium to 4 premium. The previously issued debenture stocks of the Central Electricity and the London & Home Counties are without quotable change.

Cables and Wireless

The 5½ per cent. preference stock of Cables & Wireless has risen to 61½ ex dividend, and both classes of the company's ordinary issues are also harder. Anglo-American Telegraphs retain their previous advance, but, these being sterling stocks, the rises in Trans-Atlantic Telephones exert no sympathetic influence upon them. Telephonic communication has been opened, this week, between London and Johannesburg, as well as Pretoria. The charge is £6 for three minutes and £2 a minute afterwards.

American Telephone Boomlet

American Telephone & Telegraph stock rose 25 points last week, coming up from 105, but this week's gain leaves a rise of 28 points, and has raised the quotation to 158½, the price having therefore advanced more than 50 per cent. during the past fortnight. This is one of the most spectacular of the rises which have occurred amongst dollar stocks. Many others of similar character could be cited in the American market, but few that are so dramatic. The boomlet has taken in its train the price of International Telephone & Telegraph, the latter now standing at 12¼, a gain of 3½ points on the week. For the violence of the turn-round in Wall Street, only general conditions can be advanced in explanation. The hopes which sprung from the Lausanne Conference, the rise in the price of the dollar as compared with sterling, the less dismal feeling throughout the United States as regards business prospects, and the professional encouragement afforded to the bull party, have all played parts in bringing about the change, which may be soberly called sensational. Whether the British public have made much money out of the movement is doubtful, though a narrow circle of speculators has been following the market for some time past, and the bulls are at last beginning to reap the reward of their patience.

Dollar Issues

City Services preferred shares are 5 points higher at 25. In the Canadian hydro-electric shares, Shawinigan at 18, Pennsylvania Water & Power at 65, and Montreal Light & Power at 42½, are all better on the week. Brazilian Tractions rose 1⅜ to 13⅜, and Rio Tramway 5 per cent. first mortgage bonds at 106½ are 2 points up. It may be noticed in passing that Brazilian Traction 6 per cent. preference are quoted at 90, the price having scarcely moved for six months. Mexicans have parted from some of their lately acquired strength.

Home Railway Stocks

The prices of Metropolitan Consolidated and District ordinary stocks are quoted ex dividend at 60 and 57½ respectively. Metropolitans are lower on the week, after allowing for the deduction, and there seems to be an inclination on the part of people who bought the stock more cheaply to take their present profit. Some, moreover, are selling Metropolitans and buying Districts with the money, on the theory that the latter are cheaper than the former, regarded from the long point of view. The reason for this impression was set out here last month.

Central London ordinary stock is quoted 50½, and the preferred stock 49, both ex dividend, but the assented stocks do not go ex until the end of this month. Shares in the Home tramway and traction section are scarcely changed in price. Rangoon Electric Tramways ordinary shares have advanced to 30s. 9d.

The Equipment Group

General Electric ordinary shares have hardened to 42s. Other prices in this department are very steady. Enfields, at 4, hold the 7s. 6d. rise secured last week upon the maintenance of the 10 p.c. interim dividend. Callenders and Henleys are a firm market at 58s. 9d. and 5⅛ respectively. The iron and steel group is better, Babcocks having strengthened to 43s. 9d., Vickers to 6s. 6d. Rubber shares attracted a little attention upon the produce improving to 2¼d. per lb.

Amongst what may be called miscellaneous shares, Atlas ordinary are now quoted at 8s., and the preference at £1. British Power & Light ordinary at 13s. 6d., the preference at 23s. 6d., remain at their previous prices.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1930.	1931.	Price. Aug. 9.	Rise. or Fall.	Yield, p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	70/-xd.	—	4 5 9
Brompton Ordinary	1	8½	8½	32/-	—	4 7 6
Central Electricity 4½% Deb.	Stock	4½	4½	102½	—	4 7 10
Charing Cross Ordinary	1	8½	8½	32/6xd.	—	4 7 6
Chelsea	1	8½	8½	32/-	—	4 7 6
City of London	1	10	10	42/6	—	4 14 1
Clyde Valley	1	8	7	30/-	—	4 13 4
County of London	1	11	10½	47/6	—	4 8 5
Edmundsons' 7% Pref.	1	7	7	29/-	—	4 16 7
Elec. Dis. Yorkshire	1	9	9	38/3	—	4 14 1
Elec. Supply Corporation	1	11	11	52/6	—	4 3 10
Kensington Ordinary	1	8	8	33/-	—	4 4 10
Lancs. Light and Power	1	6½	7	28/9	—	4 17 5
London & Home Counties 4½% Deb.	Stock	4½	4½	106½	—	4 4 6
London Electric	1	9	9	32/6	—	4 6 2
Metropolitan	1	10	10	45/-	—	4 9 0
Midland Counties	1	7	7	31/3	—	4 9 7
Mid. Elec. Power	1	8	8	33/3	—	4 16 9
Newcastle-on-Tyne Ordinary	1	6	6	25/-	—	4 16 0
Do. 7% Pref.	1	7	7	31/-	—	4 10 4
Northampton	1	10	10	45/-	—	4 9 0
Notting Hill 6% Pref.	10	6	6	12½	—	4 16 0
North Met. Elec. 6% Pref.	1	6	6	28/6	—	4 4 3
St. James' and Pall Mall	1	8	8	32/-	—	4 7 6
Scottish Power	1	8	—	31/3	—	5 2 5
South London	1	8½	8½	32/-	—	4 7 6
Urban Ordinary	1	7	—	28/9	—	4 17 5
Westminster Ordinary	1	8½	8½	33/-	—	4 4 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	16/3	—	9 4 8
Yorkshire Elec.	1	8	8	37/-	—	4 6 6
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	82½	—	4 17 0
Metropolitan	,,	3½	2½	60xd.	−2	4 3 4
Do. District	,,	5	4½	57½xd.	—	7 16 6
Underground Electric	1	8	7	18/-	—	7 15 7
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	158½	+2S	5 13 7
Anglo-Am. Tel. Pref.	Stock	6	6	102½	—	5 17 1
Do. Def.	,,	1½	1½	24	—	6 5 0
Cables & Wireless 5½% Pref.	,,	5½	2⅝	61½xd.	+3	4 9 5
Do. A 7½% Ord.	,,	—	Nil	19½	+1	—
Do. B Ord.	,,	—	Nil	9½	+½	—
Globe Tel. and T. Ord.	10	8½	Nil	7	—	—
Do. do. Pref.	10	6	6	10	—	6 0 0
Great Northern Tel.	10	20	20	25½	—	7 17 0
Marconi-Marine	1	15	10	28/9	—	6 19 2
Oriental Telephone Ord.	1	12	12	2½	—	*4 16 0
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	—	—	3/9	—	—
Do. do. 2nd Pref.	5	—	—	3/9	—	—
Do. do. 5% Deb.	Stock	—	—	7	—	—
British Electric Traction Def. Ord.	,,	5	5	300	—	—
Do. do. Pref. Ord.	,,	8	8	135½	—	5 18 1
Brazil Traction	100	—	—	13⅜	+1½	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	99½	+1	5 0 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	8/9	—	—
London United Tram Deb.	Stock	4	4	62½	—	6 8 0
Mexico Trams, 5% Bonds	—	5	5	22½	—	30 5 10
Mexican Light Common	100	Nil	Nil	14½	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	54½xd.	—	9 2 0
Victoria Falls Ord.	1	15	15	67/6	—	4 9 0
Yorkshire (West Riding)	1	Nil	Nil	5/-	—	—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	6	4	18/9	—	4 5 4
Do. Pref.	1	8	8	31/3	—	5 2 5
Babcock & Wilcox	1	15	14	43/9	+6d.	6 8 0
British Aluminium Ord.	1	10	5	22/-	—	4 11 0
British Insulated Ord.	1	15	15	61/3	—	4 18 0
Brush Ord.	Stock	5	Nil	40	—	—
Callender's	1	15	15	58/9	—	5 1 10
Do. 6½% Pref.	1	6½	6½	26/3	—	4 19 1
Crompton Parkinson Ord.	5/-	30	24	17/6	—	6 17 2
Do. 8% Pref.	1	8	8	30/-	—	5 6 8
Edison-Swan 1st Pref.	1	7½	7½	23/3	—	6 9 0
Do. 5% Deb.	Stock	5	5	100	—	5 0 0
Electric Construction	1	Nil	Nil	7/6	—	—
Enfield Cable Ord.	1	25	25	4	—	6 5 0
English Electric	1	Nil	Nil	10/9	—	—
Do. do. Pref.	1	Nil	Nil	12/6	—	—
Ever Ready	5/-	35	35	24/9	+9d.	7 1 5
Ferranti Pref.	1	7	7	24/6	—	5 14 3
G.E.C. Pref.	1	6½	6½	28/-	−6d.	4 12 10
Do. Ord.	1	10	8	42/-	+9d.	3 16 2
Henley's	1	30	30	5⅛	—	5 1 1
Do. 4½ Pref.	5	4½	4½	5	—	4 10 0
India-Rubber	1	Nil	Nil	3/9	—	—
Johnson & Phillips	1	10	5	½	—	5 14 3
Siemens Ord.	1	7½	7½	23/3	—	6 9 0
Telegraph Construction	12	Nil	Nil	10	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1930

39130. "Electrodes and other metal elements for vacuum electric devices." A. J. Mandell. December 30th, 1930. (376727.)

1931

1433. "Arrangement for regulating the exchange of wattless energy through interlinking lines by means of stepwise regulating transformers." Maschinenfabrik Oerlikon. January 27th, 1930. (376771.)

3311. "Coin-freed ticket printing and issuing machines." F. W. Hall and Hall Telephone Accessories (1928), Ltd. February 2nd, 1931. (376759.)

5004. "Electrical automatic maximum load devices." G. T. Champion. November 16th, 1931. (376840.)

5154. "Control of electrically propelled vehicles." Sachsenwerk Licht und-Kraft-Aks. Ges. March 13th, 1930. (376800.)

6462. "Mounting of permanent magnets." M. C. Wade and W. S. Sharpe (legal representatives of H. Wade, deceased) (Siemens Schuckertwerke Akt.-Ges.) March 2nd, 1931. (376728.)

7238. "Processes of and apparatus for the transformation and transmission of electric currents or sounds." J. Dieux. May 22nd, 1930. (Patent of addition not granted.) (376741.)

8035. "Electric heaters." British Thomson-Houston Co., Ltd. March 18th, 1930. (376804.)

8735. "Means for regulating electric currents." B. G. Horstmann, R. G. N. Knowles, and Horstmann Gear Co., Ltd. March 21st, 1931. (376843.)

9580. "Electric vacuum tubes." A. Brasch and Dr. F. Lange. April 1st, 1930. (Addition to 365609.) (376761.)

10248. "Mountings for piezo-electric crystals." E. J. C. Dixon. April 7th, 1931. (Cognate application 35201/31.) (376732.)

10273. "Dynamo-electric machines." International General Electric Co., Inc. April 8th, 1930. (376775.)

10483. "Ignition systems for internal combustion engines." H. C. Heaton. April 9th, 1931. (376776.)

10546. "Radio signalling systems." W. A. Steel. April 9th, 1930. (376763.)

10582. "Electric motor starting switches." Brookhirst Switchgear, Ltd., and J. A. Hirst. April 10th, 1931. (376809.)

10614. "Electric switch structures." E. G. Staude. November 22nd, 1930. (376810.)

10622. "Electrical condensers." P. R. Coursey and Dubilier Condenser Co. (1925), Ltd. April 10th, 1931. (376765.)

10722. "Apparatus for creating spreading rays of coloured light." Holophane, Ltd., and R. G. Williams. April 11th, 1931. (Cognate application 607/32.) (376744.)

10859. "Regulating devices for electrical machines." International General Electric Co., Inc. April 12th, 1930. (376811.)

10887. "Electrical signalling systems." Associated Telephone & Telegraph Co. April 19th, 1930. (Patent of addition not granted.) (376754.)

10911. "Process and apparatus for welding or soldering electric cables." Allgemeine Elektricitäts Ges. and B. Zeiss. April 13th, 1931. (376757.)

10955. "Thermionic valves." H. W. Adey. April 14th, 1931. (376783.)

10958. "Electric cable end joint." Micafil Akt. Ges. Werke für Elektro-Isolation. May 8th, 1930. (376812.)

11051. "Electric torches." A. Carpmael (Ling Nam Hardware Manufacturing Co.). April 14th, 1931. (376816.)

11155. "Electric transformers." A. Onwood. April 15th, 1931. (376817.)

11200. "Electric ozone generator." J. M. Daily. April 15th, 1931. (376788.)

11266. "Telegraph systems." Standard Telephones & Cables, Ltd., S. H. Grove, M. E. Federici, E. K. Sandeman and L. E. Currah. April 16th, 1931. (Addition to 12834/30.) (376820.)

11395. "Vibratory voltage and like regulators for controlling electric circuits." J. Lucas, Ltd., and J. A. Laird. April 17th, 1931. (376826.)

11426. "High voltage electric switchgear." A. Reyrolle & Co., Ltd., and J. Christie. April 17th, 1931. (Cognate application 20530/31.) (376828.)

11427. "High voltage electric switchgear." A. Reyrolle & Co., Ltd., J. Christie and D. F. Amer. April 17th, 1931. (Cognate application 20529/31.) (376829.)

11473. "Illumination appliances." General Electric Co., Ltd., and M. W. Pierce. April 17th, 1931. (376831.)

11903. "Kinema projector mechanisms associated with sound reproducing apparatus." General Electric Co., Ltd., and L. C. Bradley. January 21st, 1932. (376850.)

12172. "Control of electrically propelled vehicles." British Thomson-Houston Co., Ltd., and J. H. Cansdale. April 24th, 1931. (376855.)

12515. "Systems of electrical regulation." British Thomson-Houston Co., Ltd. April 29th, 1930. (376861.)

12648. "Systems of electrical regulation." British Thomson-Houston Co., Ltd. April 29th, 1930. (376867.)

12762. "Sound reproducing or recording apparatus employing sound record films." F. Brown. April 30th, 1931. (376868.)

12885. "Methods of and apparatus for deriving power from high voltage lines." Westinghouse Electric & Manufacturing Co. May 1st, 1930. (376869.)

13125. "Electro-magnetic units for use in loudspeakers, gramophone pick-ups, and the like." H. Sachs. May 15th, 1930. (376872.)

13644. "Means for broadcasting by high-frequency currents over electrical distribution systems." Wired Radio, Inc. June 7th, 1930. (376876.)

14134. "Junction devices for electric wires and cables." Armorduct Cable Co., Ltd. (Bergmann Elektricitäts Werke Akt.-Ges.). May 13th, 1931. (376881.)

14161. "Electric speed controlling or indicating means." General Electric Co., Ltd., and F. Munton-Jackson. May 13th, 1931. (376883.)

14517. "Cases for electric switches." H. Heath and R. W. Bill. May 16th, 1931. (376888.)

14655. "Brush holders for dynamo-electric machines." General Electric Co., Ltd., and R. Orsettich. May 18th, 1931. (376891.)

14900. "Electrical oscillation circuit arrangements." Telefunken Ges. für Drahtlose Telegraphie. May 20th, 1930. (376893.)

15120. "Means for use in transmitting and receiving broadcasting." J. V. Rushton. May 22nd, 1931. (376894.)

15308. "Electrical oscillation circuit arrangements." Telefunken Ges. für Drahtlose Telegraphie. May 23rd, 1930. (Addition to 376893.) (376898.)

15525. "Radio receiving apparatus." E. K. Cole, Ltd., and A. W. Martin. May 27th, 1931. (376901.)

15539. "Electrical insulators." Steatite & Porcelain Products, Ltd., and G. H. Halton. May 27th, 1931. (376902.)

15833. "Combined plug and socket connections and electric switches." T. H. Williams, T. H. Clarke, W. Harrison, and E. Eyre. May 30th, 1931. (376904.)

16076. "Controlling of the unwinding spools or bobbins of wire winding machines." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 16th, 1930. (376908.)

16481. "Railway signalling systems." British Thomson-Houston Co., Ltd. June 6th, 1930. (376913.)

17020. "Electric motors." E. M. Johnson and Associated Electrical Industries, Ltd. June 11th, 1931. (376917.)

18706. "Multiple filament lamps." L. C. Edwards. June 29th, 1931. (376939.)

18980. "Maximum demand indicators for electric current." Record Electrical Co., Ltd., and W. Ashworth. July 1st, 1931. (376941.)

20357. "Microphones." Siemens & Halske Akt.-Ges. August 21st, 1930. (376951.)

20538. "Location of travelling craft by wireless direction-finding apparatus." F. Chamier. July 17th, 1931. (376954.)

21457. "Electrical condensers." Siemens-Schuckertwerke Akt.-Ges. July 31st, 1930. (376965.)

22113. "Miner's safety and other electric battery lamps." Oldham & Son, Ltd., and G. H. Darby. August 4th, 1931. (376972.)

23256. "Electrical insulators." International General Electric Co., Inc. August 23rd, 1930. (376984.)

23335. "Telephonic appliances." C. M. R. Balbi. August 19th, 1931. (376986.)

23386. "Magnet systems for loudspeakers." Chorlton Metal Co., Ltd. (S. Kornfeld and G. Kogan.) August 19th, 1931. (376987.)

24364. "Apparatus for irradiating liquids." G. Tixier. August 30th, 1930. (Addition to 2161/31.) (376996.)

24797. "Supply of electric current from an external source to electrically propelled boats for amusement purposes." R. Burrow and M. J. Hill. September 3rd, 1931. (377000.)

25700. "Electromagnets." H. E. Hodgson and H. A. Sedgwick. September 22nd, 1930. (377007.)

26868. "Combined electromagnetic regulators and automatic cut-out switches." R. Bosch Akt.-Ges. October 9th, 1930. (Addition to 302590.) (377017.)

28075. "Protecting box for switches, wall plugs, or other similar electrical apparatus intended for fitting into walls." M. L. Marnay. December 5th, 1930. (377027.)

28220. "Electric connecting devices." M. Guett. November 6th, 1930. (377028.)

29160. "High tension switches." Siemens-Schuckertwerke Akt.-Ges. October 25th, 1930. (377034.)

1932

449. "Ignition arrangements for internal-combustion engines." R. Bosch Akt.-Ges. January 9th, 1931. (377094.)

1089. "Luminous electric discharge tubes." General Electric Co., Ltd. February 18th, 1931. (Addition to 351245.) (377098.)

3586. "Devices for obtaining radio reception free from interference." Naamlooze Vennootschap Philips Gloeilampenfabrieken. April 25th, 1931. (Addition to 3347/32.) (377116.)

7349. "Electric pocket lamps." Elektrotechnische Fabrik Schmidt and Co., Ges. March 11th, 1931. (377136.)

7414. "Station indicators for radio receivers." Aronwerke Elektrizitäts Atk.-Ges. September 28th, 1931. (377137.)

9140. "Electrodynamic loudspeakers." Naamlooze Vennootschap Philip's Gloeilampenfabrieken. April 2nd, 1931. (377141.)

9543. "Producing sound and picture records." I. G. Farbenindustrie Akt.-Ges. April 2nd, 1931. (377145.)

11204. "Electrical insulating caps." Naamlooze Vennootschap Ramic Union. March 5th, 1932. (377149.)

14004. "Electric wave amplifying apparatus." Boonton Research Corporation. March 19th, 1930. (Divided application on 7058-31.) (376737.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from August 3rd.

Brownie (design only). No. 531002; (lettering only), No. 531003. Class 6. Vacuum cleaning machines.—British Vacuum Cleaner & Engineering Co., Ltd., Parsons Green Lane, London, S.W.6.

Aerodyne. No. 532278. Class 8. Philosophical and scientific instruments and apparatus for useful purposes.—Hustler, Simpson & Webb, Ltd., 317, Hoe Street, Walthamstow, E.17.

Adanac. No. 532619. Class 8. Wireless telephonic apparatus, &c.—Consolidated Industries, Ltd., 245, Carlaw Avenue, Toronto, Canada. (British representatives: Rayner & Co., 5, Chancery Lane, W.C.2.)

Laundwell. No. 532985. Class 13. Electric irons.—Premier Electric Heaters, Ltd., Premier Works, Keeley Street, Birmingham.

Philips. No. 528855. Class 15. Reflectors and shades for artificial illumination.—Philips Gloielampenfabriek Maatschappij, Eindhoven, Holland. (British representatives: Dicker, Pollak and Mercer, 20-23, Holborn, E.C.1.)

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alcester (WARWICKSHIRE).—Casual wards, Poor Law Institution (£5,500); county architect.

Ashford (KENT).—Business stores, Kennington, for the Co-operative Society, High Street.

Ashington (NORTHUMBERLAND).—Houses (66); U.D.C. surveyor.

Bath.—Cinema (£75,000), for a local syndicate; E. Davies, Cardiff.

Bedford.—Alterations and improvements to premises of J. F. Monk, Castle Road, and additions to the Steam Laundry Co., Ltd., Goldington Road; E. H. C. Inskip, architect, 31, Goldington Road.

Blackburn.—Buildings, Northgate (£14,000); W. Livesey and Sons, Ltd., builders, Nova Scotia Saw Mills.

Bredbury & Romiley (CHESHIRE).—Houses (76), Harrytown Estate; Thorpe & Collier, architects, 66, Deansgate, Manchester.

Brentwood.—Extensions to Highwood Hospital (£11,850); L.C.C. architect.

Bletchingley (SURREY).—Extensions to Godstone Institution (£9,565); J. W. Wright (Builders), Ltd., South Norwood, S.E.

Brierley Hill (STAFFS).—Cinema, High Street and Rose Hill, Quarry Bank, for C. F. Couper, The Firs; A. L. Horsburgh, Great Western Buildings, Livery Street, Birmingham.

Burton-on-Trent.—Additions to premises, Ashby Road, for Freemasons' Hall, Winshill; R. S. Litherland & F. M. Palmer, architects, 10, High Street.

Buttershaw (YORKS).—Additions to Congregational Church; T. L. Dixon, architect, Stanwix House, Low Moor.

Cambridge.—Septic block, Addenbrooke's Hospital; Pick, Everard, Keay & Gimson, architects, 6, Millstone Lane, Leicester.

Carlisle.—Shop, Botcherby, for Co-operative Society, Ltd.; S. W. B. Jack,, architect.

Cheam (SURREY).—Church, with electrical and heating work; Cropley Bros., builders, Epsom.

Chester-le-Street.—Houses (50); U.D.C. surveyor, Council Offices.

Chichester.—County offices (£96,778); V. Harris, architect.

Chislehurst (KENT).—Estate development, Green Lane; Chislehurst Estates, Ltd., 348, High Road, Kilburn, N.W.

Colchester.—Alterations and additions to premises for J. Sainsbury, Ltd., 41, High Street; Hamblin, Fox & Bailey.

Croydon.—Congregational church, Sanderstead; H. Webster, The Cottage, 1, Carlton Road, South Croydon.

Darlington.—Extensions to Girls' High School; E. Minors, surveyor, Town Hall.

Dartford.—Houses (110); E. J. Hobbs, clerk, West Hill. Power houses, Paper Mills; Wiggins, Teape & Co., Ltd.

Denton (MANCHESTER).—Cinema, Acre Street and Manchester Road, for Denton Palace, Ltd.

Dewsbury.—Houses (32), Lees Holm Estate; borough engineer and trade contractors.

Dumfries.—Houses (96); burgh surveyor.

Durham.—Sewage disposal works (£10,000); J. N. Adams, surveyor, Bywell Lodge.

East Sussex.—Senior school, Rye, for the E.C.; E. A. Verger, county architect, County Hall, Lewes.

Edinburgh.—Machinery house for brick works at West Wharf, Granton, for W. Hunter & Sons; G. Sinclair, architect, 21, Castle Street. Theatre, West End, for the directors of the Masque Theatre; R. Cochran, director. Addition to St. Anthony's R.C. School and extension of city chambers; city architect.

Elgin.—Extensions to fever hospital for Moray and Nairn C.C.; county clerk.

Essex.—Extensions, nurses' home, Brentwood Mental Hospital, for the C.C.; J. Stuart, county architect, Chelmsford.

Evesham (WORCESTER).—Infirmary extensions (£10,000); county architect.

Ewell (SURREY).—Houses (21), near Park Avenue; Stoneleigh Trust, Ltd.

Farnham.—Estate development, Hollow Oak, Coxbridge; G. Finn.

Fifeshire.—Houses (120), for the C.C.; clerk, Cupar.

Finchley.—Shops, Totteridge Lane, St. Margaret's Avenue; C. F. Day, Ltd., builders, High Road.

Finedon (NORTHANTS).—Casual wards (£14,000); county architect.

Gateshead-on-Tyne.—Alterations and extensions to St. Joseph's Church, Bensham Road; E. Thompson, builder, Dinnington, Northumberland.

Glasgow.—Bakery for Caledonia Oatcake Baking Co., Ltd., 19, Glenfarg Street; the manager. Cinema, Balmore Road and Hawthorn Street; W. H. Martin. Buildings for Refuge Assurance Co., Ltd., Benfield Street and Bath Street; S. Birkett, architect, Manchester. New St. Teresa's R.C. Church, Hamilton Hill; Rev. J. Conlon, St. Joseph's Presbytery, North Woodside Road. Workshops for the University; J. Hughes, architect, 121, Douglas Street.

Great Yarmouth.—Re-erection of Floral Hall, Britannia Pier (£10,000); H. Tunbridge, manager. Regal Theatre; Yates, Cook and Derbyshire, architects, 43, Great Marlborough Street, London, W.

Halifax.—Block of shops, King Cross Street (£21,300); borough engineer. Bazaar stores for Marks & Spencer, Ltd., London. Carpet dyehouse, Lee Bridge, for J. Crossley & Sons, Ltd.

Hastings.—Aerodrome, Pebsham Estate, for the Corporation. Development of Barley Lane Estate for J. H. G. Vine; H. M. Jeffery, architect.

Hoyland Nether (YORKS).—Houses (30); J. R. Shepherd, surveyor.

Huddersfield.—Houses (20) for aged persons, Lowerhouses Lane, Almondbury; borough engineer, 1, Peel Street.

Ipswich.—Factory for Comper Aircraft Co., Ltd. Civic aerodrome (£10,500); city engineer.

Irish Free State (ARDEE, Co. LOUTH).—Electrical installation at mental hospital, for the Committee of Management; J. P. Tierney & Co., consulting engineers, 44, Kildare Street, Dublin.

Kent.—Casual ward improvements, Cranbrook, Faversham and Pembury; county architect, Maidstone.

Kidderminster.—Alterations and improvements to branch premises, Worcester Street, for the Industrial Co-operative Society, Ltd., Oxford Street.

Lanarkshire.—School, Airdrie (£18,000), for C.C.; master of works, Hamilton.

Lanchester (Co. DURHAM).—Houses (1,000); R.D.C. surveyor, Council Offices.

Leicester.—School, Balfour Street (£2,810); Armson & Hollis.

London (EAST HAM).—Additions to St. Michael's Schools, Arthur Road; Marshall & Partners. (LEYTON).—Health clinic and infant welfare centre; borough engineer. (MILE END).—Nurses' home extension, Poor Law Institution (£21,850); L.C.C. architect.

Manchester.—Hospital; secretary, Northern Hospital for Women and Children, Park Place, Cheetham Hill Road. Additions to bakery for Duncan & Foster, Ltd., York Street, Chorlton-upon-Medlock; F. Jones & H. A. Dalrymple, architects, 178, Oxford Road.

Middlesex.—Junior school, Potter's Bar, for the county E.C.; director of education, 40, Eccleston Square, S.W.

Monkseaton (NORTHUMBERLAND).—Church for Newcastle Presbytery, Woodleigh Road and Eastfield Avenue; A. K. Tasker, Trinity Buildings, New Bridge Street, Newcastle-on-Tyne.

Montrose (ANGUS).—New La Scala Cinema; W. M. Patrick and Co., architects, 19, High Street.

Nelson.—New Reedyford Hospital for the Board of Management (£18,000); T. Dent & Sons, builders, Brook Street.

Newbiggin (NORTHUMBERLAND).—Houses (24) for aged people; J. Kailofar, surveyor, Council Offices.

Newcastle-on-Tyne.—Four-storey sorting office and subway at the Post Offices; H.M. Office of Works, King Charles Street, S.W.1.

Newport (I.O.W.).—Houses (24), for the T.C.; W. G. Simmonds, builder.

Northfleet.—Houses (100), Hall Road; R. Hopkins and Sons, Gravesend.

Northumberland.—Remodelling of Hexham Girls' and Infants' School for the C.C.; W. W. Tasker, architect, 17, Claremount Road, Newcastle.

Padiham (LANCS).—Houses (60); U.D.C. surveyor.

Parson Drove (CAMBRIDGE).—School (£4,431); A. Coward, Wisbech.

Portsmouth.—Library, Cosham (£3,000); borough engineer.

Rawtenstall.—Alterations to buildings for J. R. Myerscough and Sons, Ltd., Hollymouth Garage; A. Brocklehurst and Co., architects, St. James Chambers, Waterfoot, near Bacup.

Reigate.—Extensions to Surrey Poor Law Institution (£137,760); county architect, Kingston.

Retford.—Extensions to Poor Law Institution (£3,759); H. James, Mansfield.

Rochdale.—New branch, Yorkshire Street, for the Yorkshire Penny Bank, Ltd.; R. and T. Howarth, builders, Crossfield Works.

Rochester.—Houses (82), Temple Estate; city surveyor.

Rotherham.—Houses (200), Eastwood and Herringthorpe Estates; borough engineer. Works extensions, Alsing Road; Howell and Co., Ltd. Alterations to Hippodrome, Henry Street; Hippodrome, Ltd. Extensions, Nottingham Street; Deans Electrical and Engineering Co., Ltd.

Rowley Regis (BIRMINGHAM).—Houses (550), Grace Mary Estate; L. J. Taylor, U.D.C. surveyor.

Rushden (NORTHANTS).—Extensions to County Sanatorium (£5,500), architect.

Sedgefield (DURHAM).—Houses (100); J. Stones, R.D.C. surveyor.

Sheffield.—Houses (40), Colchester Road; Miss I. M. Helliwell. Five shops, City Road; E. and H. Oliver.

Shipley.—Variety theatre and shops, Leeds Road, for G. Whittaker; W. Hall, architect, 10, Commercial Street, Halifax.

Southend-on-Sea.—School, Thorpe; F. W. Smith, education architect, Municipal Buildings.

South Shields.—Houses (122), Green Lane and West Park Lake, and the Tyne Dock (110); P. Watson, borough surveyor. Greyhound racing track at Horsley Hill; E. Pether, contractor, Colnbrook, Buckinghamshire.

Stafford.—Houses (81), for the T.C.; Sabin and Young, Ltd., Walsall (54), and J. Morgan and Sons (27), builders.

Stockton-on-Tees.—Houses (162), Sunderland Glebe Estate, for the T.C.; J. P. Stainsly, architect, 25, High Street. Additions to Cleveland House, Hartburn; Ashmore, Benson, Pease and Co., Ltd. Additions to St. Peter's Church; Rev. J. McGill. School, Hartburn, for the E.C.; J. P. Wakeford, borough engineer, Town Hall.

Stratford-on-Avon.—Re-erection of joinery works, Shottery, for J. G. Fincher and Co., Ltd.

Sundon (BEDS).—Casual wards (£18,000); county surveyor.

Tanfield (Co. DURHAM).—Sewage disposal works; Mr. Heslop, surveyor, Council Offices.

Wallsend.—Estate development, near Churchill Street; Battle Hill Estate Co.

Walsall.—Tuberculosis sanatorium (£4,602), for the T.C.; borough surveyor.

Warwickshire.—School, Kenilworth (£8,125); J. and H. Judd, Streatley, Berks.

Washington (DURHAM).—Houses (46); R. J. Swaddle, surveyor, Council Chambers.

Weetslade (NORTHUMBERLAND).—Houses (40), Seaton Delaval and Hazelrigg; H. G. McNaught, surveyor, Council Offices, Dudley.